CURRICULUM COMMITTEE REPORT

The Curriculum Committee met on February 12th, 2019 and recommends the following courses to the Graduate Board for approval at its February 28th, 2019 meeting.

New Courses:

PSY 581 Supervision, Consultation, and Interprofessional Issues

BMS 605 Professionalism and Responsible Conduct of Research in Biomedical Science and Engineering

Modifications:

CSD Prerequisite Change

FSN 501 Advanced Human Nutrition

FSN 530 Integrative and Functional Nutrition

FSN 603 Nutrients and Food Processing

The following new courses were considered by the Curriculum Committee in January but were still pending revisions. These courses are now ready for approval.

New courses:

BEN 502 Advanced Materials in Bio-inspired Engineering

BEN 503 Advanced Instrumental Design

BEN 512 Modeling of Biomedical Systems

BEN 580 Computational Methods in Biomedical Engineering

BMB 520 Introduction to Image Analysis

EDT 532 Creative and Connected Learning Environments

February 11, 2019

To: Curriculum Committee:
Scott Delcourt
Qian Xue
Stuart Marrs
Craig Mason
Grant Miles
Josh Kelley
Deborah Rollins
Lisa Stilley

Fr: Kacey Beckwith, Administrative Specialist

Re: **Curriculum Committee, February 12, 2019 Stodder Hall, Room #48**

The following courses will be presented on **Tuesday, February 12th at 1:00 p.m**. in the Graduate School's Conference Room, 48 Stodder Hall.

1. 1:15-1:25 **PSY 581**

   Rebecca Schwartz-Mette

2. 1:35-1:45 **BMS 605**

   Ian Meng

3. 1:45-1:50 **CSD Department Modification**

   No presentation

4. 1:50-1:55 **FSN 501**

   No presentation

5. 1:55-2:00 **FSN 530**

   No presentation

6. 2:00-2:05 **FSN 603**

   No presentation

THE UNIVERSITY OF MAINE

NEW COURSE PROPOSAL/MODIFICATION/ELIMINATION FORM FOR GRADUATE COURSES

Graduate course proposals, modifications, or eliminations must be submitted to the Graduate School no later than the 3rd of each month. Please refer to the Graduate School website for the Curriculum Committee meetings schedule. Electronic signatures and submission is required.

Please return the completed e-form with appropriate signatures and documentation to the Graduate School by saving the form to your desktop and sending as an attachment to graduate@maine.edu. Please include in the subject line 'Course Proposal' and the course designator and number.

GRADUATE PROGRAM/UNIT Doctoral Program in Clinical Psychology

COURSE DESIGNATOR PSY COURSE NUMBER 581 EFFECTIVE SEMESTER Summer 2019

COURSE TITLE Supervision, Consultation, and Interprofessional Issues

REQUESTED ACTION

NEW COURSE (check all that apply, complete Section 1, and submit a complete syllabus):

- [x] New Course
- [ ] New Course with Electronic Learning
- [ ] Experimental

MODIFICATION (Check all that apply and complete Section 2):

- [ ] Designator Change
- [ ] Number Change
- [ ] Title Change
- [ ] Description Change
- [ ] Prerequisite Change
- [ ] Credit Change
- [ ] Cross Listing (must be at least 400-level)[1]
- [ ] Other (specify) _____

ELIMINATION:

- [ ] Course Elimination

ENDORSEMENTS

Please sign using electronic signatures. If you do not already have a digital signature, please click within the correct box below and follow the on-screen instructions.

Leader, Initiating Department/Unit(s)

Thane Fremouw Digitally signed by Thane Fremouw Date: 2019.01.10 12:41:16 -05'00'

College(s) Curriculum Committee Chair(s) [if applicable]

James W. Warholak James W. Warholak 1/15/2019

Michael A. Robbins Michael A. Robbins 1/15/2019

College Dean(s)

Graduate School [sign and date]

1. Courses cross-listed below 400-level require the permission of the Graduate School.

SECTION 1 (FOR NEW COURSE PROPOSALS)

Proposed Catalog Description (include designator, number, title, prerequisites, credit hours):

Designator: PSY; Number: 581
Title: Supervision, Consultation, and Interprofessional Issues

This course is designed to build students' initial competencies in clinical supervision, clinical consultation, and in navigating interprofessional issues. Students will critically evaluate the existing empirical literature on supervision, consultation, and interprofessional issues; obtain working knowledge of guiding theories for supervision, consultation, and interprofessional functioning; and gain first-hand experience of the practice of supervision, consultation, and interprofessional work through peer supervision, peer consultation, and interprofessional role plays.

Prerequisites: Permission; Credit hours: 3

Components (type of course/used by Student Records for MaineStreet) – *Multiple selections are possible for courses with multiple non-graded components:*

☐ Applied Music	☐ Clinical	☐ Field Experience/Internship	☐ Research	☐ Studio
☐ Laboratory	■ Lecture/Seminar	☐ Recitation	☐ Independent Study	☐ Thesis

Text(s) planned for use:

Clinical Supervision: A Competency-Based Approach (Falender & Shafranske, 2004)

Other readings (journal articles) to be assigned and provided by instructor.

Course Instructor (include name, position, teaching load):

Rebecca Schwartz-Mette, PhD.
Assistant Professor (2:2 teaching load; 50%)

Reason for new course:

This course is proposed to meet the training and licensure needs of doctoral students in the Clinical Psychology program, to respond to feedback from the American Psychological Association (APA) Committee on Accreditation (CoA), and to keep pace with the current trends in graduate psychology education which include focused training in supervision, consultation, and interprofessional issues. To date, the Clinical Program has offered a three-course sequence (1 credit each: PSY 681, 682, 683) in supervision and consultation, which is limited in important ways. The sequencing of these courses is often irregular for students, the 1-credit per course format significantly limits opportunities for active learning (e.g., practice of supervision and consultation), and the existing courses do not include any training in interprofessional/interdisciplinary work, which is fast becoming the norm in clinical psychology (e.g., integrated health care, behavioral medicine). To address the limitations of the former three, 1-credit course sequence, this course proposal reflects a focused attempt to improve and enhance our current training in supervision, consultation, and interprofessional issues.

Does the course addition require additional department or institutional facilities, support and/or resources, e.g. new lab facilities, computer support and services, staffing (including graduate teaching assistants), or library subscriptions and resources?

◉ No. The department will not request additional resources for this course.

○ Yes. Please list additional resources required and note how they will be funded or supported.

What other departments/programs are affected (e.g. course overlap, prerequisites)? Have affected departments/programs been consulted? Any concerns expressed? Please explain.

None. There are no comparable courses currently offered at the University of Maine in Psychology or other departments.

How often will this course be offered? Will offering this course result in overload salary payments, either through the college or CED, either to the instructor of this course or to anyone else as a result of rearranging teaching assignments?

This course will be offered every other summer semester (alternating with PSY 507).

Supervision, Consultation, and Interprofessional Issues
PSY 581
Summer 2019

Credit hours: 3
Prerequisites: Permission

Instructor: Dr. Rebecca A. Schwartz-Mette
Office: 360 Little Hall
Office hours: By appointment

Course delivery method: In-person
Course meeting days/times: M-F, 9am-11:50am (June 10-June 28, 2019)
Course meeting location: TBD

Course Overview and Goals

Clinical supervision, consultation, and interprofessional functioning are essential, core competencies for psychologists (Competency Benchmarks; Kaslow et al., 2009). Competent supervision is the key to ensuring that trainees deliver ethical and effective services. Consultation also is a core competency for psychologists and likewise reflects an engaging, rewarding, and challenging contribution to our colleagues both in and outside of the field. Finally, given the increasingly interprofessional nature of psychologists' work (e.g., integrated health care), the ability to navigate and work with professionals from allied health care fields is critical. As such, focused and intentional training in clinical supervision, consultation, and interprofessional issues is essential. The goal of the course is to provide an introduction to the theory, practice, and emerging empirical research regarding supervision, consultation, and interprofessional issues in clinical psychology. Trainees will build on knowledge, awareness, and skills acquired in this course throughout the remainder of their graduate training and into their careers.

Student Learning Activities and Outcomes

By taking and participating in this course, students will gain initial competence in supervision, in consultation, and in navigating interprofessional issues by:

- Critically evaluating the existing empirical literature on supervision, consultation, and inteprofessional issues
- Obtaining working knowledge of guiding theories for supervision, consultation, and interprofessional functioning
- Gaining first-hand experience of the practice of supervision, consultation, and interprofessional work through peer supervision, peer consultation, and interprofessional role plays

Required Texts

1. Clinical Supervision: A Competency-Based Approach (Falender & Shafranske, 2004)

Additional required readings will be assigned and provided by the instructor.

Course Requirements and Grading

Roughly half of each class period will be devoted to discussing the day's assigned readings. The other half of class each day will be devoted to active learning and role plays. Below, each of the course requirements/assignments are described along with points possible for each.

1) *Attendance and participation in class discussions and activities.* Students are expected to complete all readings independently and before each class period for which they are assigned. Active participation from all students is expected. *5 points per class, 75 points.*
2) *Pre-reflection and self-assessment paper.* At the start of the course, students will respond to a reflection/self-assessment prompt provided by the instructor. *25 points.*
3) *Reading summary/discussion leader.* Each student will be assigned one day of class for which they will briefly (5-10 minutes) summarize the assigned readings and lead that day's discussion. *25 points.*
4) *Peer supervision experience*. Each student will provide and receive peer supervision for an ongoing clinical case twice during the course. *50 points.*
5) *Peer consultation experience*. Each student will provide and receive consultation to another student in the class regarding a clinical issue once during the course. *25 points.*
6) *Interprofessional role play and ethics project*. In assigned pairs, students will design their own interprofessional vignettes that highlight the intersectionality of psychologists' work and potential ethical issues that may arise therein. They will then engage in a role play and discussion of interprofessional and ethical issues to consider in such a situation for the class. *25 points.*
7) *Post-reflection and self-assessment paper.* At the end of the course, students will respond to a reflection/self-assessment prompt provided by the instructor. *25 points.*

Total points possible: 250

A	225-250 points
B	200-224 points
C	175-199 points
D	150-174 points
F	149 points or fewer

Course Expectations and Climate

This course reflects psychology's commitment to training, service, and working with allied professionals. As psychologists, we have an ethical responsibility to prepare ourselves to work effectively with trainees and supervisees, consultees, and other professionals. In order to be successful in these regards, we must acquire knowledge, awareness, and skills to this end. We also must be open to self-reflection and self-assessment as a necessary component of this process. We must embrace that we do not know what we do not know and embrace a non-defensive stance to learning about ourselves, our supervisees, consultees, and colleagues.

The process and outcome of this class depends in large part on the contributions of its members. Each student is asked to be ready and committed to explore material through readings, class discussions, in-and out-of-class activities, and class assignments. It is expected that each of us prepare for each class meeting by completing the assigned readings and reflecting upon the material prior to attending class. *Please keep in mind and respect that this course, while taught in condensed form during the summer, reflects a regular semester's worth of in-class time and out-of-class preparation and work. Students should be prepared to devote a significant amount of time*

outside of class to completion of course requirements. It is also expected that any course work is completed independently, unless otherwise specified by the instructor.

The more each of us gives to the class, the richer the experience will be for all of us. Each student has something important to contribute to this class. In order for this class to be a success, each of us needs to be willing to share and contribute to the process. Given that students will be asked to provide and receive peer supervision and consultation, as well as to participate in role-plays designed for educational purposes, students may, at times feel nervous, vulnerable, and/or as if their work is on display. I invite all of us to remember that we are *supposed to be learning* and that *perfection is not the goal*, so that we may dive into this learning process openly, earnestly, and non-judgmentally.

Course Policies

Attendance. Students are expected to be prepared for and attend every class meeting.

Classroom civility. The success of this course and the potential for students to benefit from the course depends in large part on the respect, patience, courage, and participation of its members. Disrespectful language and/or behavior (including non-participation) will not be tolerated. Inclusive and non-discriminatory language is expected at all times. *See also Course Expectations and Climate above.*

Late assignments. Late assignments will not be accepted. Assignments submitted late will receive a failing grade.

Campus Policies

Please carefully review the information accessible via the following link for the campus policies regarding academic honesty, student accessibility services, course disruptions, observance of religious holidays/events, and sexual discrimination reporting. The information available via this link represents the current versions of these campus policies. You are responsible for reviewing this information. If you have any questions about campus policies, please see the instructor.

https://umaine.edu/citl/teaching-resources-2/required-syllabus-information/

Course Schedule (subject to change)

Week 1: 6/10-6/14

- **(1) Monday, 6/10: Introductions, Syllabus, Intro to Clinical Supervision**
  Reading for discussion today:
  1) Falender and Shafranske, Ch. 1
  2) Falender and Shafranske, Appendix A

  Assignment:
  Peer supervision experiences #1 and #2 (explained in class today; due 6/17 and 6/24)

  Due:
  Pre-reflection paper due today

- **(2) Tuesday, 6/11: Components of Quality Supervision**
  Reading for discussion today:
  1) Falender and Shafranske, Ch. 2 and 3
  2) Falender and Shafranske, Appendix G

- **(3) Wednesday, 6/12: Personal Factors in Clinical Supervision**
  Reading for discussion today:
  1) Falender and Shafranske, Ch. 4 and 5
  2) Falender and Shafranske, Appendix B, F, and H

- **(4) Thursday, 6/13: The Case for a Deliberate Practice Model for/in Clinical Supervision**
  Reading for discussion today:
  1) Rousmaniere, Chapter 1 and 2

  Assignment:
  Peer consultation experience (due 6/20)

- **(5) Friday, 6/14: Multicultural Competence in Clinical Supervision**
  Reading for discussion today:
  1) Falender and Shafranske, Ch. 6
  2) Falender and Shafranske, Appendices C, D, and E

Week 2: 6/17-6/21

- **(6) Monday, 6/17: Ethics in Clinical Supervision**
  Reading for discussion today:
  1) Falender and Shafranske, Ch. 7
  2) Falender and Shafranske, Appendices I, J, K, and L

  Due:
  Peer supervision experience #1 (to be discussed in class)

- **(7) Tuesday, 6/18: Evaluation and Evolution of Clinical Supervision**
  Reading for discussion today:
  1) Falender and Shafranske, Ch. 8 and 9

- **(8) Wednesday, 6/19: What is Clinical Consultation?**
  Reading for discussion today:
  1) Lowman, Ch. 1
  2) Leonard, H. S., Freedman, A. M., & Kilburg, R. (2013). Tribal elders' views of consulting psychology's past, present, and future. *Consulting Psychology Journal: Practice and Research, 65*, 266-277.
  3) Liebowitz, B. & Blattner, J. (2015). On becoming a consultant: The transition for a clinical psychologist. *Consulting Psychology Journal: Practice and Research, 67,* 144-161.

- **(9) Thursday, 6/20: Clinical Consultation in Practice**
  Reading for discussion today:
  1) Lowman, Ch. 2, 3, and 4

  Due:
  Peer consultation experience (to be discussed in class)

- **(10) Friday, 6/21: Ethical Issues in Clinical Consultation**
  Reading for discussion today:
  1) Lowman and Cooper, Ch. 4 and 5

  Assignment:
  Interprofessional role plays and ethics project (due 6/27 and 6/28)

Week 3: 6/24-6/28

- **(11) Monday, 6/24: Consulting and Interprofessional Work in Primary Care**
  Reading for discussion today:
  1) Competencies for work in PC settings (APA, 2015)
  2) Robinson, J. D. & Baker, J. (2006). Psychological consultation and services in a general medical hospital. *Professional Psychology: Research and Practice, 3,* 264-267.
  3) Garman, A. N. & Canar, W. J. (2013). Consulting psychology in the health sector: A reflection on the last and next decades. *Consulting Psychology Journal: Practice and Research, 65,* 309-313.

  Assignment:
  Post-reflection paper (due 6/28)
  Due:
  Peer supervision experience #2 (to be discussed in class)

- **(12) Tuesday, 6/25: Interprofessional Issues in Primary Care Settings, Part 1**
  Reading for discussion today:
  1) Hodgson, J., Mendenhall, T., & Lamson, A.(2013). Patient and provider relationships: Consent, confidentiality, and managing mistakes integrated primary care settings. *Families, Systems, & Health, 31,* 28-40.
  2) Hudgins, C., Rose, S., Fifield, P. Y., & Arnault, S. (2013). Navigating the legal and ethical foundations of informed consent and confidentiality in integrated primary care. *Families, Systems, & Heath, 31,* 9-19.
  3) Kanzler, K. E., Goodie, J. L., Hunter, C. L., Glotfelter, M. A., & Bodart, J. J. (2013). From colleague to patient: Ethical challenges in integrated primary care. *Families, Systems, & Heath, 31,* 41-48.
  4) Reiter, J., & Runyan, C. (2013). The ethics of complex relationships in primary care behavioral health. *Families, Systems, & Heath, 31,* 20-27.

- **(13) Wednesday, 6/26: Interprofessional Issues in Primary Care Settings, Part 1, Part 2**
  Reading for discussion today:
  1) Mullin, D., & Stenger, J. (2013). Ethical matters in rural integrated primary care settings. *Families, Systems, & Heath, 31,* 69-74.
  2) Dobmeyer, A. C. (2013). Primary care behavioral health: Ethical issuse in miltitary settings. *Families, Systems, & Heath, 31,* 60-68.
  3) Rosenberg, T. & Speice, J. (2013). Integrating care when the end is near: Ethical dilemmas in end-of-life care. *Families, Systems, & Heath, 31,* 75-83.

- **(14) Thursday, 6/27: Interprofessional Work in Specialized Settings (School, Business)**
  Reading for discussion today:
  1) Rosenfeld, S. (2013). Consultation in the schools—Are we there yet? *Consulting Psychology Journal, Practice and Research, 65,* 303-308.
  2) Sperry, L. (2013). Executive coaching and leadership assessment: Past, present, and future. *Consulting Psychology Journal, Practice and Research, 65,* 284-288.
  3) Pavur, E. J. (2013). Why do organizations want their leaders to be coached? *Consulting Psychology Journal, Practice and Research, 65,* 289-293.

4) Kaiser, R. B. & Curphy, G. (2013). Leadership development: The failure of an industry and the opportunity for consulting psychologists. *Consulting Psychology Journal, Practice and Research, 65,* 294-302.

Due:
Interprofessional role plays and ethics project presentations (Group 1)

- **(15) Friday, 6/28: Tying it all Together…**
  Due:
  Interprofessional role plays and ethics project presentations (Group 2)
  Post-reflection paper due today

THE UNIVERSITY OF MAINE

NEW COURSE PROPOSAL/MODIFICATION/ELIMINATION FORM FOR GRADUATE COURSES

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Please return the completed e-form with appropriate signatures and documentation to the Graduate School by saving the form to your desktop and sending as an attachment to graduate@maine.edu. Please include in the subject line 'Course Proposal' and the course designator and number.

GRADUATE PROGRAM/UNIT Graduate School of Biomedical Science and Engineering

COURSE DESIGNATOR BMS COURSE NUMBER 605 EFFECTIVE SEMESTER Summer 2019

COURSE TITLE Professionalism and Responsible Conduct of Research in Biomedical Science and Engineering

REQUESTED ACTION

NEW COURSE (check all that apply, complete Section 1, and submit a complete syllabus):

- [x] New Course
- [ ] New Course with Electronic Learning
- [ ] Experimental

MODIFICATION (Check all that apply and complete Section 2):

- [ ] Designator Change
- [ ] Number Change
- [ ] Title Change
- [ ] Description Change
- [ ] Prerequisite Change
- [ ] Credit Change
- [ ] Cross Listing (must be at least 400-level)[1]
- [ ] Other (specify) _____

ELIMINATION:

- [ ] Course Elimination

ENDORSEMENTS

Please sign using electronic signatures. If you do not already have a digital signature, please click within the correct box below and follow the on-screen instructions.

Leader, Initiating Department/Unit(s)

David Neivandt Digitally signed by David Neivandt Date: 2018.05.25 08:16:13 -04'00'

College(s) Curriculum Committee Chair(s) [If applicable]

College Dean(s)

Graduate School [sign and date]

1. Courses cross-listed below 400-level require the permission of the Graduate School.

SECTION 1 (FOR NEW COURSE PROPOSALS)

Proposed Catalog Description (include designator, number, title, prerequisites, credit hours):

BMS 605 Professionalism and Responsible Conduct of Research in Biomedical Science and Engineering
Prerequisites: none. 2 Cr.

The National Institutes of Health defines responsible conduct of research as the practice of scientific investigation with integrity. It involves the awareness and application of established professional norms and ethical principles in the performance of all activities related to scientific research. Case studies will be used to explore current issues related to the responsible conduct of research, with a focus on professional norms and ethical principles. Through weekly readings, didactic presentations and small group discussions and role playing, students will learn to critically examine ethical questions that arise in the practice of scientific research, and identify the most responsible course of action. Topics include mentor/mentee responsibilities and relationships, collaborative research, authorship, peer review, conflicts of interest, data management, human subject protections, animal welfare, laboratory safety, research misconduct, and ethical issues in biomedical research. Application of the established norms and ethical principles will promote honesty, accuracy, rigor, and reproducibility in research while providing an inclusive and supportive scientific research environment.

Components (type of course/used by Student Records for MaineStreet) – *Multiple selections are possible for courses with multiple non-graded components:*

☐ Applied Music ☐ Clinical ☐ Field Experience/Internship ☐ Research ☐ Studio
☐ Laboratory ☐ Lecture/Seminar ☐ Recitation ☐ Independent Study ☐ Thesis

Text(s) planned for use:

"On Being a Scientist: A Guide to Responsible Conduct in Research" Third Edition, National Academy of Science, Engineering and Public Policy, 2009

Course Instructor (include name, position, teaching load):

Ian Meng, Professor, Department of Biomedical Sciences, University of New England, Full Graduate Faculty UMaine GSBSE

Reason for new course:

The GSBSE would like its PhD and PSM students to take a responsible conduct of research and professionalism course that is tailored to issues that arise the Biomedical Sciences and Engineering

Does the course addition require additional department or institutional facilities, support and/or resources, e.g. new lab facilities, computer support and services, staffing (including graduate teaching assistants), or library subscriptions and resources?

◉ No. The department will not request additional resources for this course.

◯ Yes. Please list additional resources required and note how they will be funded or supported.

What other departments/programs are affected (e.g. course overlap, prerequisites)? Have affected departments/programs been consulted? Any concerns expressed? Please explain.

No known overlap with other programs/departments; although graduate students in some related programs may wish to take this course rather than INT 601

How often will this course be offered? Will offering this course result in overload salary payments, either through the college or CED, either to the instructor of this course or to anyone else as a result of rearranging teaching assignments?

Every summer. It is anticipated that the instructor will be compensated by DLL as for other core GSBSE courses

Professionalism and Responsible Conduct of Research in Biomedical Science and Engineering

BMS605 (2 credits, pass/fail)

Course Director:

Ian Meng, PhD

Stella Maris room 304
University of New England
11 Hills Beach Rd
Biddeford ME 04005

imeng@une.edu

(207) 602-2195

Course description

The National Institutes of Health defines responsible conduct of research as the practice of scientific investigation with integrity. It involves the awareness and application of established professional norms and ethical principles in the performance of all activities related to scientific research.

Case studies will be used to explore current issues related to the responsible conduct of research, with a focus on professional norms and ethical principles. Through weekly readings, didactic presentations and small group discussions and role playing, students will learn to critically examine ethical questions that arise in the practice of scientific research, and identify the most responsible course of action. Topics include mentor/mentee responsibilities and relationships, collaborative research, authorship, peer review, conflicts of interest, data management, human subject protections, animal welfare, laboratory safety, research misconduct, and ethical issues in biomedical research. Application of the established norms and ethical principles will promote honesty, accuracy, rigor, and reproducibility in research while providing an inclusive and supportive scientific research environment.

Learning outcomes

By the end of the course students will be able to:

- Understand the importance, history and social context of ethical issues in scientific research, and the roles and responsibilities of scientists in society.
- Understand the limitations of regulations and policies and variations in standards across fields, institutions, and labs.
- Understand what constitutes scientific misconduct and the required reporting and investigation procedures.
- Understand the importance of fostering research integrity and professional character.
- Identify potential conflicts of interest in the conduct of research, including external pressures and personal bias.
- Identify key elements of an ethical situation, including stakeholders, relevant ethical and legal norms, relevant facts, and options and critically reason using ethical principles or values.
- Identify strategies for preventing ethical problems in research (e.g., keeping appropriate records).

Format

This 8-week long course meets twice per week, using a combination of didactic lectures (50 min) and small-group role playing and discussions of case studies (110 min). Lectures will be presented online through a live feed. Faculty will lead small group discussions on each campus that must be attended in person.

Assessment

Course evaluation is based on attendance and participation (50%) and weekly written assignments (50%). Attendance will be taken and is mandatory. Unexcused absences from 3 or more classes will result in the student receiving a non-passing grade. Weekly written assignments consist of short answer responses to case study questions. In the weekly discussion groups, attendance and participation grades will be assessed by the instructor as well as through self-evaluation, using a rubric that includes punctuality, professionalism, and communication skills. For a passing grade, exemplary or acceptable assessment levels are required for a minimum of 6 of the 8 meetings. In addition, exemplary or acceptable assessment levels are required on 6 of the 8 written assignments in order to receive a passing grade.

Cases and readings

"On Being a Scientist: A Guide to Responsible Conduct in Research" contains short introductions to the topics for each week and case studies. It is available for free online at http://books.nap.edu/catalog.php?record_id=12192

Most cases and role playing are based on those developed by the US Department of Health and Human Services Office of Research Integrity. These resources can be found at https://ori.hhs.gov/rcr-casebook-stories-about-researchers-worth-discussing. This resource is referred to as the RCR Casebook.

Additional readings and cases that will be used were developed for the Office of Research Integrity by Columbia University and can be found at https://ori.hhs.gov/education/products/columbia_wbt/index.html. This resource is referred to as the RCR courses portal.

Lecture topics and readings

Week	Topic	Readings
1: Lecture	Introduction; mentor/mentee relationships	On Being a Scientist, pp1-7
Small group discussion		RCR Casebook: Mentor and Trainee Relationships RCR Courses portal: Course 2 (introduction and case study)
2: Lecture	Human subject protections; animal welfare; biosafety	On Being a Scientist, pp 24-28
Small group discussion		RCR Casebook: Mentor and Trainee Relationships RCR Courses portal: Courses 8, 9, and 10 (introduction and case studies)
3: Lecture	Data acquisition and management	On Being a Scientist, pp 8-11
Small group discussion		RCR Casebook: Data Acquisition and Management RCR Courses portal: Course 6 (introduction and case studies)
4: Lecture	Conflicts of interest	On Being a Scientist, pp 43-47
Small group discussion		RCR Casebook: Conflicts of Interest RCR Courses portal: Course 1 (introduction and case studies)
5: Lecture	Collaborative research	On Being a Scientist, pp 29-34
Small group discussion		RCR Casebook: Collaboration RCR Courses portal: Course 4 (introduction and case studies)

6: Lecture	Authorship, publication and peer review	On Being a Scientist, pp 35-39
Small group discussion		RCR Casebook: Authorship and Publication; Peer Review RCR Courses portal: Courses 3 and 5 (introduction and case studies)
7: Lecture	Scientific research misconduct	On Being a Scientist, pp 12-23
Small group discussion		RCR Casebook: Research Misconduct RCR Courses portal: Courses 7 (introduction and case studies)
8: Lecture	Scientists as responsible members of society	On Being a Scientist, pp 48-50
Small group discussion		RCR Casebook: Social responsibility

- **Academic Honesty Statement:** Academic honesty is very important. It is dishonest to cheat on exams, to copy term papers, to submit papers written by another person, to fake experimental results, or to copy or reword parts of books or articles into your own papers without appropriately citing the source. Students committing or aiding in any of these violations may be given failing grades for an assignment or for an entire course, at the discretion of the instructor. In addition to any academic action taken by an instructor, these violations are also subject to action under the University of Maine Student Conduct Code. The maximum possible sanction under the student conduct code is dismissal from the University.

- **Students Accessibility Services Statement:** If you have a disability for which you may be requesting an accommodation, please contact Student Accessibility Services, 121 East Annex, 581.2319, as early as possible in the term. Students who have already been approved for accommodations by SAS and have a current accommodation letter should meet with me (Dr. Ian Meng) privately as soon as possible.

- **Course Schedule Disclaimer (Disruption Clause):** In the event of an extended disruption of normal classroom activities, the format for this course may be modified to enable its completion within its programmed time frame. In that event, you will be provided an addendum to the syllabus that will supersede this version.

- **Observance of Religious Holidays/Events:** The University of Maine recognizes that when students are observing significant religious holidays, some may be unable to attend classes or labs, study, take tests, or work on other assignments. If they provide adequate notice (at least one week and longer if at all possible), these students are allowed to make up course requirements as long as this effort does not create an unreasonable burden upon the instructor, department or University. At the discretion of the instructor, such coursework could be due before or after the examination or assignment. No adverse or prejudicial effects shall result to a student's grade for the examination, study, or course requirement on the day of religious observance. The student shall not be marked absent from the class due to observing a significant religious holiday. In the case of an internship or clinical, students should refer to the applicable policy in place by the employer or site.

- **Sexual Discrimination Reporting**

  The University of Maine is committed to making campus a safe place for students. Because of this commitment, if you tell a teacher about an experience of **sexual assault, sexual harassment, stalking, relationship abuse (dating violence and domestic violence), sexual misconduct or any form of gender discrimination** involving members of the campus, **your teacher is required to report**

this information to the campus Office of Sexual Assault & Violence Prevention or the Office of Equal Opportunity.

If you want to talk in confidence to someone about an experience of sexual discrimination, please contact these resources:

For *confidential resources on campus*: **Counseling Center: 207-581-1392** or **Cutler Health Center: at 207-581-4000**.

For *confidential resources off campus*: **Rape Response Services:** 1-800-310-0000 or **Partners for Peace**: 1-800-863-9909.

Other resources: The resources listed below can offer support but may have to report the incident to others who can help:

For *support services on campus*: **Office of Sexual Assault & Violence Prevention: 207-581-1406**, **Office of Community Standards: 207-581-1409**, **University of Maine Police: 207-581-4040 or 911**. Or see the OSAVP website for a complete list of services at http://www.umaine.edu/osavp/

NEW COURSE PROPOSAL/MODIFICATION/ELIMINATION FORM FOR GRADUATE COURSES

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GRADUATE PROGRAM/UNIT Communication Sciences and Disorders

COURSE DESIGNATOR CSD COURSE NUMBER _____ EFFECTIVE SEMESTER Fall 2019

COURSE TITLE see attached letter

REQUESTED ACTION

NEW COURSE (check all that apply, complete Section 1, and submit a complete syllabus):

- ☐ New Course
- ☐ New Course with Electronic Learning
- ☐ Experimental

MODIFICATION (Check all that apply and complete Section 2):

- ☐ Designator Change
- ☐ Number Change
- ☐ Title Change
- ☐ Description Change
- ■ Prerequisite Change
- ☐ Credit Change
- ☐ Cross Listing (must be at least 400-level)[1]
- ☐ Other (specify) _____

ELIMINATION:

- ☐ Course Elimination

ENDORSEMENTS

Please sign using electronic signatures. If you do not already have a digital signature, please click within the correct box below and follow the on-screen instructions.

Leader, Initiating Department/Unit(s)

_____

College(s) Curriculum Committee Chair(s) [if applicable]

_____

College Dean(s)

_____

Graduate School [sign and date]

_____

1. Courses cross-listed below 400-level require the permission of the Graduate School.

SECTION 2 (FOR COURSE MODIFICATIONS)

Current catalog description (include designator, number, title, prerequisites, credit hours):

see attached letter

Proposed catalog description (include designator, number, title, prerequisites, credit hours):

see attached letter

Reason for course modification:

All of our graduate courses currently have a prerequisite/permission of "Department Consent Required". As a result, faculty advisors must register students for courses. We would like to modify this prerequisite so that graduate students are able to register for themselves.

SECTION 3 FOR COURSE ELIMINATIONS

Reason for Elimination

Please return the completed e-form with appropriate signatures and documentation to the Graduate School by saving the form to your desktop and sending as an attachment to graduate@maine.edu. Please include in the subject line 'Course Proposal' and the course designator and number.

Department of Communication Sciences and Disorders
Madelyn E. and Albert D. Conley Speech, Language and Hearing Center

THE UNIVERSITY OF MAINE

5724 Dunn Hall
Orono, Maine 04469-5724
Tel: 207.581.2006
umaine.edu

January 31, 2019

Scott Delcourt
Graduate School
University of Maine
5775 Stodder Hall
Orono, Maine 04469

Re: Course Modification – Prerequisite/Permission Change

Dear Scott,

For the graduate courses listed below, I am requesting that "Department Consent Required", which is currently listed as a prerequisite/permission, be replaced with "CSD Graduate Students Only". Let me know if you require anything further.

CSD 581: Articulation and Phonology Disorders
CSD 582: Voice Disorders
CSD 583: Fluency Disorders
CSD 584: Language Disorders in Children: Preschool
CSD 585: Language Disorders in Children: School-Age
CSD 586: Current Issues in Clinical Practice
CSD 588: Audiologic Rehabilitation
CSD 601: Seminar in Research Methods
CSD 682: Current Issues in Aphasia, Right Hemisphere Deficits and Dementia
CSD 683: Seminar in Clinical Procedures I
CSD 684: Seminar in Clinical Procedures II
CSD 685: Diagnostic Process in Speech-Language Pathology
CSD 686: Clinical Practicum
CSD 687: Swallowing Disorders
CSD 688: Neurocognitive Disorders in Adults
CSD 689: Motor Speech Disorders
CSD 690: Directed Research 1
CSD 691: Directed Research II
CSD 699: Graduate Thesis/Research

Sincerely,

Christopher M. Grindrod, PhD
Graduate Program Coordinator
Department of Communication Sciences and Disorders

THE UNIVERSITY OF MAINE

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GRADUATE PROGRAM/UNIT Food Science & Human Nutrition

COURSE DESIGNATOR FSN COURSE NUMBER 501 EFFECTIVE SEMESTER Fall 2019

COURSE TITLE Advanced Human Nutrition

REQUESTED ACTION

NEW COURSE (check all that apply, complete Section 1, and submit a complete syllabus):

- ☐ New Course
- ☐ New Course with Electronic Learning
- ☐ Experimental

MODIFICATION (Check all that apply and complete Section 2):

- ☐ Designator Change
- ☐ Number Change
- ☐ Title Change
- ☒ Description Change
- ■ Prerequisite Change
- ☐ Credit Change
- ☐ Cross Listing (must be at least 400-level)[1]
- ☐ Other (specify) _____

ELIMINATION:

- ☐ Course Elimination

ENDORSEMENTS

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Leader, Initiating Department/Unit(s)

College(s) Curriculum Committee Chair(s) [if applicable]

College Dean(s)

Graduate School [sign and date]

1. Courses cross-listed below 400-level require the permission of the Graduate School.

SECTION 2 (FOR COURSE MODIFICATIONS)

Current catalog description (include designator, number, title, prerequisites, credit hours):

FSN 501 - Advanced Human Nutrition
Basic nutrition science with emphasis on energy, protein, vitamin, mineral and endocrine function and metabolism.

Prerequisites & Notes
FSN 410 or permission.

Credits: 3

Proposed catalog description (include designator, number, title, prerequisites, credit hours):

FSN 501 - Advanced Human Nutrition
Basic nutrition science with an emphasis on carbohydrate, lipid, protein, vitamin, mineral functions, and metabolism. Genetic influences on nutrient needs and metabolism.

Prerequisites & Notes
Two courses in chemistry or permission. A nutrition class is recommended. Online, asynchronous course.

Credits: 3

Reason for course modification:

The description had not been modified to reflect new content. FSN 501 will be the gateway course in nutrition for online students in the proposed UMaineGOLD certificate and degree. Potential students may not have had a previous nutritional biochemistry class, so more basic information will be added to FSN 501.

SECTION 3 FOR COURSE ELIMINATIONS

Reason for Elimination

Please return the completed e-form with appropriate signatures and documentation to the Graduate School by saving the form to your desktop and sending as an attachment to graduate@maine.edu. Please include in the subject line 'Course Proposal' and the course designator and number.

THE UNIVERSITY OF MAINE

NEW COURSE PROPOSAL/MODIFICATION/ELIMINATION FORM FOR GRADUATE COURSES

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GRADUATE PROGRAM/UNIT Food Science and Human Nutrition

COURSE DESIGNATOR FSN COURSE NUMBER 530 EFFECTIVE SEMESTER Spring 2020

COURSE TITLE Integrative and Functional Nutrition

REQUESTED ACTION

NEW COURSE (check all that apply, complete Section 1, and submit a complete syllabus):

- ☐ New Course
- ☐ New Course with Electronic Learning
- ☐ Experimental

MODIFICATION (Check all that apply and complete Section 2):

- ☐ Designator Change
- ☐ Number Change
- ☐ Title Change
- ■ Description Change
- ☐ Prerequisite Change
- ☐ Credit Change
- ☐ Cross Listing (must be at least 400-level)[1]
- ■ Other (specify) will be online

ELIMINATION:

- ☐ Course Elimination

ENDORSEMENTS

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Leader, Initiating Department/Unit(s)

College(s) Curriculum Committee Chair(s) [if applicable]

College Dean(s)

Graduate School [sign and date]

1. Courses cross-listed below 400-level require the permission of the Graduate School.

SECTION 2 (FOR COURSE MODIFICATIONS)

Current catalog description (include designator, number, title, prerequisites, credit hours):

FSN 530 - Integrative and Functional Nutrition
Review of alternative practices such as traditional Chinese medicine, Ayurvedics, homeopathy, naturopathy, herbal medicine, and dietary supplements and how these practices can be integrated with conventional dietetic practice. Special needs of different life stages and disease conditions are addressed.

Prerequisites & Notes:
FSN 410 and NUR 303, or permission.

Credits: 3

Proposed catalog description (include designator, number, title, prerequisites, credit hours):

FSN 530 - Integrative and Functional Nutrition
Review of alternative practices such as traditional Chinese medicine, Ayurveda, homeopathy, naturopathy, herbal medicine, and dietary supplements and how these practices can be integrated with conventional dietetic practice. Special needs of different life stages and disease conditions are addressed. Online class with scheduled discussions.

Prerequisites & Notes:
FSN 501, or permission. Prior classes in medical nutrition therapy recommended.

Credits: 3

Reason for course modification:

The class is transitioning from a hybrid online/live class to one that is fully asychronous except for scheduled mutually-convenient discussions via Zoom. FSN 530 will be an elective class in the GOLD graduate certificate in Human Nutrition, and is part of Professor Mary Ellen Camire's regular teaching load in Spring semesters of even years.

SECTION 3 FOR COURSE ELIMINATIONS

Reason for Elimination

Please return the completed e-form with appropriate signatures and documentation to the Graduate School by saving the form to your desktop and sending as an attachment to graduate@maine.edu. Please include in the subject line 'Course Proposal' and the course designator and number.

THE UNIVERSITY OF MAINE

NEW COURSE PROPOSAL/MODIFICATION/ELIMINATION FORM FOR GRADUATE COURSES

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GRADUATE PROGRAM/UNIT Food Science & Human Nutrition

COURSE DESIGNATOR FSN COURSE NUMBER 603 EFFECTIVE SEMESTER Summer 2019

COURSE TITLE Nutrients and Food Processing

REQUESTED ACTION

NEW COURSE (check all that apply, complete Section 1, and submit a complete syllabus):

- ☐ New Course
- ☐ New Course with Electronic Learning
- ☐ Experimental

MODIFICATION (Check all that apply and complete Section 2):

- ☐ Designator Change
- ☐ Number Change
- ☒ Title Change
- ☐ Description Change
- ☒ Prerequisite Change
- ☐ Credit Change
- ☐ Cross Listing (must be at least 400-level)[1]
- ☐ Other (specify) _____

ELIMINATION:

- ☐ Course Elimination

ENDORSEMENTS

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Leader, Initiating Department/Unit(s)

College(s) Curriculum Committee Chair(s) [if applicable]

College Dean(s)

Graduate School [sign and date]

1. Courses cross-listed below 400-level require the permission of the Graduate School.

SECTION 2 (FOR COURSE MODIFICATIONS)

Current catalog description (include designator, number, title, prerequisites, credit hours):

FSN 603 Nutrients and Food Processing
Review of the changes in food nutrient composition and bioavailability during processing from harvest to consumers.

Prerequisites & Notes:
FSN 410, FSN 502 or permission.

Credits: 3

Proposed catalog description (include designator, number, title, prerequisites, credit hours):

FSN 603 Nutrient Changes in the Food System
Review of the changes in food nutrient and phytochemical composition and bioavailability from the farm through processing and distribution to consumers.

Prerequisites & Notes:
FSN 501 or permission.

Credits: 3

Reason for course modification:

Students did not understand that nutrition at all stages of the food system were discussed in the class. The course has included discussion of phytochemicals (non-nutrient chemicals in plant foods that offer health benefits) and the course description should reflect that inclusion.This class will be an elective for on-line graduate certificate students and full-time University of Maine graduate students in the Summer.

SECTION 3 FOR COURSE ELIMINATIONS

Reason for Elimination

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THE UNIVERSITY OF MAINE

NEW COURSE PROPOSAL/MODIFICATION/ELIMINATION FORM FOR GRADUATE COURSES

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GRADUATE PROGRAM/UNIT Master's of Science in Biomedical Engineering

COURSE DESIGNATOR BEN COURSE NUMBER 502 EFFECTIVE SEMESTER Fall 2019

COURSE TITLE Advanced Materials in Bio-inspired Engineering

REQUESTED ACTION

NEW COURSE (check all that apply, complete Section 1, and submit a complete syllabus):

- [x] New Course
- [ ] New Course with Electronic Learning
- [ ] Experimental

MODIFICATION (Check all that apply and complete Section 2):

- [ ] Designator Change
- [ ] Number Change
- [ ] Title Change
- [ ] Description Change
- [ ] Prerequisite Change
- [ ] Credit Change
- [ ] Cross Listing (must be at least 400-level)[1]
- [ ] Other (specify) _____

ELIMINATION:

- [ ] Course Elimination

ENDORSEMENTS

Please sign using electronic signatures. If you do not already have a digital signature, please click within the correct box below and follow the on-screen instructions.

Leader, Initiating Department/Unit(s)

Douglas Bousfield Digitally signed by Douglas Bousfield Date: 2018.12.03 09:15:38 -05'00'

College(s) Curriculum Committee Chair(s) (if applicable)

12-4-18

College Dean(s)

Graduate School [sign and date]

1. Courses cross-listed below 400-level require the permission of the Graduate School.

SECTION 1 (FOR NEW COURSE PROPOSALS)

Proposed Catalog Description (include designator, number, title, prerequisites, credit hours):

BEN 502 Advanced Materials in Bio-inspired Engineering
This course will cover advanced materials inspired by nature using directed problem solving and hands-on exploration, building on information learned in BEN 403. Students will be exposed to the power of an integrated approach to engineering which draws on biological principles and materials science to create the materials of the future. Class notes: Students will need to have a good background in chemistry, physics, biology, and mathematics. Credit hours: 3

Components (type of course/used by Student Records for MaineStreet) – *Multiple selections are possible for courses with multiple non-graded components:*

- ☐ Applied Music
- ☐ Clinical
- ☐ Field Experience/Internship
- ☐ Research
- ☐ Studio
- ☐ Laboratory
- ■ Lecture/Seminar
- ☐ Recitation
- ☐ Independent Study
- ☐ Thesis

Text(s) planned for use:

N/A

Course Instructor (include name, position, teaching load):

Caitlin Howell, Assistant Professor of Biomedical Engineering
Teaching load: 1-2 courses per semester

Reason for new course:

To align the MS degree our department now offers with the undergraduate degree, and to make the degree a meaningful step towards a career or another graduate degree, we think important changes are needed to the current MS degree in Biological Engineering as soon as possible. In addition, the requirement of 12 credit hours of 500 level or above classes for MS degrees is hard for our current students to meet. With the recent hire of two Lecturers and two Assistant Professors, we should be able to offer some graduate level classes at least on bi-annual basis. We think some of the undergraduate students will be interested to take these classes as technical electives.

Does the course addition require additional department or institutional facilities, support and/or resources, e.g. new lab facilities, computer support and services, staffing (including graduate teaching assistants), or library subscriptions and resources?

- ◉ No. The department will not request additional resources for this course.
- ◯ Yes. Please list additional resources required and note how they will be funded or supported.

What other departments/programs are affected (e.g. course overlap, prerequisites)? Have affected departments/programs been consulted? Any concerns expressed? Please explain.

How often will this course be offered? Will offering this course result in overload salary payments, either through the college or CED, either to the instructor of this course or to anyone else as a result of rearranging teaching assignments?

This course will be offered bi-anually in the Spring. There will not be any overload salary associated with it.

BEN 502 Advanced Materials in Bio-inspired Design

Catalog Description:
In this course we will explore cutting-edge, bio-inspired design solutions as well as the process of discovering and understanding the natural principles behind them. Students will then develop their own bio-inspired design, drawing from and synthesizing their knowledge of engineering, biology, chemistry, and physics to address a relevant problem in industry or medicine.

Credit Hours: 3

Class notes: Students will need to have a good background in chemistry, physics, biology, and mathematics.

Textbook Required: TBD

Course Objectives:
At the end of the course, students will be able to:

- Describe the engineering principles behind a range of current bio-inspired technologies
- Analyze quantitative concepts from the primary literature describing the biology, chemistry, and physics behind a natural system
- Synthesize interdisciplinary concepts to creatively identify bio-inspired solutions
- Engineer an effective bio-inspired design into a product to address a current problem

Topics Covered:

- Current bio-inspired designs and strategies including
  - Biomedical Materials
  - Robotics
  - Active Surfaces
  - Computing
  - Optics
  - Energy harvesting and saving materials
- Engineering assessment of natural objects and systems
- Bio-inspired ideation of solutions to student-identified problems

Grading:

Special Topic Research and Discussion:	20 pts each: 140 pts total
Found Object Exercises:	20 pts each: 60 pts total
Final Design Project:	50 pts
Class Effort	50 pts
TOTAL	***250 pts***

The assignments will be scored using a detailed rubric given at the start of class. Letter grades will follow typical levels of >93%=A; > 90%=A- ; >87% = B+; >83%=B; >80%=B-; > 77%=C+; >73% = C; >70%=C-.

For other University of Maine class policies, students should consult: ***https://umaine.edu/citl/teaching-resources-2/required-syllabus-information/***

THE UNIVERSITY OF MAINE

Submit Form

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GRADUATE PROGRAM/UNIT Master's of Science in Biomedical Engineering

COURSE DESIGNATOR BEN COURSE NUMBER 503 EFFECTIVE SEMESTER Fall 2019

COURSE TITLE Advanced Instrumentation Design

REQUESTED ACTION

NEW COURSE (check all that apply, complete Section 1, and submit a complete syllabus):

- [x] New Course
- [ ] New Course with Electronic Learning
- [ ] Experimental

MODIFICATION (Check all that apply and complete Section 2):

- [ ] Designator Change
- [ ] Number Change
- [ ] Title Change
- [ ] Description Change
- [ ] Prerequisite Change
- [ ] Credit Change
- [ ] Cross Listing (must be at least 400-level)[1]
- [ ] Other (specify) _____

ELIMINATION:

- [ ] Course Elimination

ENDORSEMENTS

Please sign using electronic signatures. If you do not already have a digital signature, please click within the correct box below and follow the on-screen instructions.

Leader, Initiating Department/Unit(s)

Douglas Bousfield Digitally signed by Douglas Bousfield Date: 2018.12.03 09:15:38 -05'00'

College(s) Curriculum Committee Chair(s) (if applicable)

12-4-18

College Dean(s)

Graduate School [sign and date]

1. Courses cross-listed below 400-level require the permission of the Graduate School.

SECTION 1 (FOR NEW COURSE PROPOSALS)

Proposed Catalog Description (include designator, number, title, prerequisites, credit hours):

This project based course will focus on the rational design of instrumentation for the observation and quantification of specific phenomena in complex and biological systems. A range of widely used clinical, diagnostic and therapeutic techniques will be reviewed through study of literature. Individual student projects form the basis for class discussion where theory, design, component specification and assessment, of capabilities and limitations, are explored. Sensitivity analysis will be employed to identify design weaknesses and fundamental design limitations. Detailed and fully specified instrumental designs will be produced and their feasibility assessed. Credit Hours: 3

Components (type of course/used by Student Records for MaineStreet) – *Multiple selections are possible for courses with multiple non-graded components:*

☐ Applied Music ☐ Clinical ☐ Field Experience/Internship ☐ Research ☐ Studio

☐ Laboratory ■ Lecture/Seminar ☐ Recitation ☐ Independent Study ☐ Thesis

Text(s) planned for use:

to be determined.

Course Instructor (include name, position, teaching load):

Mike Mason, Professor, 1-2 courses per semester.

Reason for new course:

To align our current MS degree in Biological Engineering with the undergraduate degree, and to make the degree a meaningful step towards a career or another graduate degree, important changes are quickly needed. In addition, the 12-credit hours requirement of 500 level or above classes for MS degrees is hard for our current students to meet. With the recent addition of five faculty (two Lecturers, two Assistant Professors, and an Associate Professor), we are able to offer graduate level classes at least on a bi-annual basis. Undergrads will be interested in these classes as well

Does the course addition require additional department or institutional facilities, support and/or resources, e.g. new lab facilities, computer support and services, staffing (including graduate teaching assistants), or library subscriptions and resources?

◉ No. The department will not request additional resources for this course.

◯ Yes. Please list additional resources required and note how they will be funded or supported.

What other departments/programs are affected (e.g. course overlap, prerequisites)? Have affected departments/programs been consulted? Any concerns expressed? Please explain.

This course builds on BEN 403. There is no overlap with other courses taught at the University of Maine. There are no formal prerequisites, but students with little background should take BEN 403 first.

How often will this course be offered? Will offering this course result in overload salary payments, either through the college or CED, either to the instructor of this course or to anyone else as a result of rearranging teaching assignments?

This course will be offered at least every other year. No overload is required.

BEN 503 **Advanced Instrument Design**

Catalog Description:
This project based course will focus on the rational design of instrumentation for the observation and quantification of specific phenomena in complex and biological systems. A range of widely used clinical, diagnostic and therapeutic techniques will be reviewed through study of literature. Individual student projects form the basis for class discussion where theory, design, component specification and assessment, of capabilities and limitations, are explored. Sensitivity analysis will be employed to identify design weaknesses and fundamental design limitations. Detailed and fully specified instrumental designs will be produced and their feasibility assessed.

Credit Hours: 3

Class Notes: Students will need to have a good background in chemistry, physics and mathematics.

Textbook Required: *TBD*

Course Objectives
At the end of this course, students should be able to

- Identify and quantify governing physical phenomena leading to observable signal
- Apply sensitivity analysis to identify key design weaknesses and limitations
- Design instrumentation to optimize sensitivity for desired quantity of interest
- Understand how Signal, Noise and Contrast influence instrumentation.
- Summarize, specify and communicate design elements

Topics Covered:

- Review of photo-physical phenomena leading to observable signals
- Absolute and relative sensitivity
- Application of physical limitation to design
- Discrete energy balance and design process
- Design specification and optimization
- Hardware validation

Grading:

Journal Review/Discussion	100 pts
Project Pre-Design/Specification	200 pts
Final Project	200 pts
TOTAL	***500 pts***

The assignments will be scored using a detailed rubric given at the start of class. Letter grades will follow typical levels of >93%=A; > 90%=A- ; >87% = B+; >83%=B; >80%=B-; > 77%=C+; >73% = C; >70%=C-.

For other University of Maine class policies, students should consult:

https://umaine.edu/citl/teaching-resources-2/required-syllabus-information/

THE UNIVERSITY OF MAINE

Submit Form

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GRADUATE PROGRAM/UNIT Master's of Science in Biomedical Engineering

COURSE DESIGNATOR BEN COURSE NUMBER 512 EFFECTIVE SEMESTER Fall 2019

COURSE TITLE Modeling of Biomedical Systems

REQUESTED ACTION

NEW COURSE (check all that apply, complete Section 1, and submit a complete syllabus):

- [x] New Course
- [ ] New Course with Electronic Learning
- [ ] Experimental

MODIFICATION (Check all that apply and complete Section 2):

- [ ] Designator Change
- [ ] Number Change
- [ ] Title Change
- [ ] Description Change
- [ ] Prerequisite Change
- [ ] Credit Change
- [ ] Cross Listing (must be at least 400-level)[1]
- [ ] Other (specify) _____

ELIMINATION:

- [ ] Course Elimination

ENDORSEMENTS

Please sign using electronic signatures. If you do not already have a digital signature, please click within the correct box below and follow the on-screen instructions.

Leader, Initiating Department/Unit(s)

Douglas Bousfield Digitally signed by Douglas Bousfield Date: 2018.12.03 09:15:38 -05'00'

College(s) Curriculum Committee Chair(s) (if applicable)

12-4-18

College Dean(s)

Graduate School [sign and date]

1. Courses cross-listed below 400-level require the permission of the Graduate School.

SECTION 1 (FOR NEW COURSE PROPOSALS)

Proposed Catalog Description (include designator, number, title, prerequisites, credit hours):

This course will focus on the use of advanced computational tools to help quantify biomedical solutions that address clinical, therapeutic, and diagnostic problems. The use of a finite element program to describe situations such as blood flow in complex passages, flow in microfluidic devices, oxygen transport in tissue, and drug delivery will be emphasized as well as other techniques.

Credit Hours: 3

Components (type of course/used by Student Records for MaineStreet) – *Multiple selections are possible for courses with multiple non-graded components:*

☐ Applied Music ☐ Clinical ☐ Field Experience/Internship ☐ Research ☐ Studio

☐ Laboratory ■ Lecture/Seminar ☐ Recitation ☐ Independent Study ☐ Thesis

Text(s) planned for use:

Transport Phenomena in Biological Systems, Truskey, Yuan and Katz, Pearson Prentice Hall, Upper Saddle River, NJ, 2007, 2nd Edition

Course Instructor (include name, position, teaching load):

TBD

Reason for new course:

To align our current MS degree in Biological Engineering with the undergraduate degree, and to make the degree a meaningful step towards a career or another graduate degree, important changes are quickly needed. In addition, the 12-credit hours requirement of 500 level or above classes for MS degrees is hard for our current students to meet. With the recent addition of five faculty (two Lecturers, two Assistant Professors, and an Associate Professor), we are able to offer graduate level classes at least on a bi-annual basis. Undergrads will be interested in these classes as well

Does the course addition require additional department or institutional facilities, support and/or resources, e.g. new lab facilities, computer support and services, staffing (including graduate teaching assistants), or library subscriptions and resources?

◉ No. The department will not request additional resources for this course.

◯ Yes. Please list additional resources required and note how they will be funded or supported.

What other departments/programs are affected (e.g. course overlap, prerequisites)? Have affected departments/programs been consulted? Any concerns expressed? Please explain.

How often will this course be offered? Will offering this course result in overload salary payments, either through the college or CED, either to the instructor of this course or to anyone else as a result of rearranging teaching assignments?

BEN 512 **Modeling of Biomedical Systems**

Catalog Description:
This course will focus on the use of advanced computational tools to help quantify biomedical solutions that address clinical, therapeutic, and diagnostic problems. The use of a finite element program to describe situations such as blood flow in complex passages, flow in microfluidic devices, oxygen transport in tissue, and drug delivery will be emphasized as well as other techniques.

Credit Hours: 3

Class notes: Students will need a good background in calculus and differential equations.

Textbook Required: *Transport Phenomena in Biological Systems,* Truskey, Yuan and Katz, Pearson Prentice Hall, Upper Saddle River, NJ, 2007, 2nd Edition

Course Objectives
At the end of this course, students should be able to

- Recognize the proper transport, mechanical, or electrical equations that govern the key physics given any situation
- Simplify complex problems to those that are tractable with the available tools
- Arrive at solutions that give meaningful guidelines for the design of biomedical solutions
- Communicate solutions in a concise manner

Topics Covered:

- Introduction to basic transport laws
- Introduction to finite element methods
- Equations of momentum
- Non-Newtonian rheology
- Mass transfer and diffusion
- Unsteady-state scenarios
- Complex problems involving a combination of physics

Grading: Students will work on around ten projects. Each project will require a concise report. The reports will be scored on the basis of 100 points using a detailed rubric given at the start of class. Letter grades will follow typical levels of >93%=A; > 90%=A- ; >87% = B+; >83%=B; >80%=B-; > 77%=C+; >73% = C; >70%=C-.

For other University of Maine class policies, students should consult:

https://umaine.edu/citl/teaching-resources-2/required-syllabus-information/

THE UNIVERSITY OF MAINE

Submit Form

NEW COURSE PROPOSAL/MODIFICATION/ELIMINATION FORM FOR GRADUATE COURSES

Graduate course proposals, modifications, or eliminations must be submitted to the Graduate School no later than the 3rd of each month. Please refer to the Graduate School website for the Curriculum Committee meetings schedule. Electronic signatures and submission is required.

Please return the completed e-form with appropriate signatures and documentation to the Graduate School by saving the form to your desktop and sending as an attachment to graduate@maine.edu. Please include in the subject line 'Course Proposal' and the course designator and number.

GRADUATE PROGRAM/UNIT Master's of Science in BiomedicalEngineering

COURSE DESIGNATOR BEN COURSE NUMBER 580 EFFECTIVE SEMESTER Fall 2019

COURSE TITLE Computational Methods in Biomedical Engineering

REQUESTED ACTION

NEW COURSE (check all that apply, complete Section 1, and submit a complete syllabus):

- [x] New Course
- [ ] New Course with Electronic Learning
- [ ] Experimental

MODIFICATION (Check all that apply and complete Section 2):

- [ ] Designator Change
- [ ] Number Change
- [ ] Title Change
- [ ] Description Change
- [ ] Prerequisite Change
- [ ] Credit Change
- [ ] Cross Listing (must be at least 400-level)[1]
- [ ] Other (specify) _____

ELIMINATION:

- [ ] Course Elimination

ENDORSEMENTS

Please sign using electronic signatures. If you do not already have a digital signature, please click within the correct box below and follow the on-screen instructions.

Leader, Initiating Department/Unit(s)

Douglas Bousfield Digitally signed by Douglas Bousfield Date: 2018.12.03 09:15:38 -05'00'

College(s) Curriculum Committee Chair(s) (if applicable)

12-4-18

College Dean(s)

Graduate School [sign and date]

1. Courses cross-listed below 400-level require the permission of the Graduate School.

SECTION 1 (FOR NEW COURSE PROPOSALS)

Proposed Catalog Description (include designator, number, title, prerequisites, credit hours):

In this course we explore cutting-edge computational methods and their applications to study biomedical data, from DNA sequence data, to fluorescence microscopy, radiography, holography, and next-generation label free imaging techniques. Computational tools studied including scripting languages such as Python and Perl, statistical software such as R, and image analysis software such as ImageJ.

Credit hours: 3

Components (type of course/used by Student Records for MaineStreet) – *Multiple selections are possible for courses with multiple non-graded components:*

☐ Applied Music	☐ Clinical	☐ Field Experience/Internship	☐ Research	☐ Studio
☐ Laboratory	■ Lecture/Seminar	☐ Recitation	☐ Independent Study	☐ Thesis

Text(s) planned for use:

Chapra, S.C. & Canale, R.P., Numerical Methods for Engineers, 7th Ed. McGraw-Hill, 2015.

Course Instructor (include name, position, teaching load):

Andre Khalil, Associate Professor of Biomedical Engineering
Teaching load: 1-2 courses per semester

Reason for new course:

To align our current MS degree in Biomedical Engineering with the undergraduate degree, and to make the degree a meaningful step towards a career or another graduate degree, important changes are needed. In addition, the 12-credit hours requirement of 500 level or above classes for MS degrees is hard for our current students to meet with the limited 500 level courses offered. With the recent addition of five faculty (two Lecturers, two Assistant Professors, and an Associate Professor), we are able to offer graduate level classes at least on a bi-annual basis. Undergrads will

Does the course addition require additional department or institutional facilities, support and/or resources, e.g. new lab facilities, computer support and services, staffing (including graduate teaching assistants), or library subscriptions and resources?

◉ No. The department will not request additional resources for this course.

○ Yes. Please list additional resources required and note how they will be funded or supported.

What other departments/programs are affected (e.g. course overlap, prerequisites)? Have affected departments/programs been consulted? Any concerns expressed? Please explain.

No course overlap. Prerequisites are normal mathematics background for engineering students.

How often will this course be offered? Will offering this course result in overload salary payments, either through the college or CED, either to the instructor of this course or to anyone else as a result of rearranging teaching assignments?

This course will be offered anually in the Fall. There will not be any overload salary associated with it.

BEN 580: Computational Methods in Biomedical Engineering
Fall 2019

Catalog Description:

In this course we explore cutting-edge computational methods and their applications to study biomedical data, from DNA sequence data, to fluorescence microscopy, radiography, holography, and next-generation label free imaging techniques. Computational tools studied including scripting languages such as Python and Perl, statistical software such as R, and image analysis software such as ImageJ.

Credit hours: 3

Class notes: Students will need to have a good background in calculus and differential equations.

Textbook Required: Chapra, S.C. & Canale, R.P., *Numerical Methods for Engineers*, 7th Ed. McGraw-Hill, 2015.

Course Objectives:

- Learn about basic and advanced computational techniques in biomedical engineering
- Explore the field of radiomics and computational engineering with biomedical data
- Become familiar with software MATLAB, R, ImageJ/Fiji, LastWave, and others.

Grading:

Each student will work on around eight assignments of varying difficulty. The reports will be scored on the basis of 100 points using a detailed rubric given at the start of class. Letter grades will follow typical levels of >93%=A; > 90%=A- ; >87% = B+; >83%=B; >80%=B-; > 77%=C+; >73% = C; >70%=C-.

Topics Covered:

- Programing basics
- Numerical techniques in differential equations and linear algebra
- Biostatistics
- Biomedical signal processing
- Multidimensional biomedical data analysis
- Analysis of biomedical images

For other University of Maine class policies, students should consult: ***https://umaine.edu/citl/teaching-resources-2/required-syllabus-information/***

THE UNIVERSITY OF MAINE

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Please return the completed e-form with appropriate signatures and documentation to the Graduate School by saving the form to your desktop and sending as an attachment to graduate@maine.edu. Please include in the subject line 'Course Proposal' and the course designator and number.

GRADUATE PROGRAM/UNIT Molecular and Biomedical Sciences

COURSE DESIGNATOR BMB COURSE NUMBER 520 EFFECTIVE SEMESTER F 19

COURSE TITLE Introduction to Image Analysis

REQUESTED ACTION

NEW COURSE (check all that apply, complete Section 1, and submit a complete syllabus):

- [x] New Course
- [ ] New Course with Electronic Learning
- [ ] Experimental

MODIFICATION (Check all that apply and complete Section 2):

- [ ] Designator Change
- [ ] Number Change
- [ ] Title Change
- [ ] Description Change
- [ ] Prerequisite Change
- [ ] Credit Change
- [ ] Cross Listing (must be at least 400-level)[1]
- [ ] Other (specify) _____

ELIMINATION:

- [ ] Course Elimination

ENDORSEMENTS

Please sign using electronic signatures. If you do not already have a digital signature, please click within the correct box below and follow the on-screen instructions.

Leader, Initiating Department/Unit(s)

Robert Gundersen Digitally signed by Robert Gundersen Date: 2019.01.09 14:28:10 -05'00'

College(s) Curriculum Committee Chair(s) [if applicable]

College Dean(s)

Graduate School [sign and date]

1. Courses cross-listed below 400-level require the permission of the Graduate School.

SECTION 1 (FOR NEW COURSE PROPOSALS)

Proposed Catalog Description (include designator, number, title, prerequisites, credit hours):

BMB 520 Introduction to Image Analysis. 3 Credit Hours. Prerequisites: None.
The current expectations of rigor and reproducibility in biomedical sciences require quantification of results obtained through microscopy. This course introduces students to the basics of working with digital microscopy images and focuses on the quantification of fluorescence microscopy data using ImageJ and MATLAB.

Components (type of course/used by Student Records for MaineStreet) – *Multiple selections are possible for courses with multiple non-graded components:*

- ☐ Applied Music
- ☐ Clinical
- ☐ Field Experience/Internship
- ☐ Research
- ☐ Studio
- ■ Laboratory
- ☐ Lecture/Seminar
- ☐ Recitation
- ☐ Independent Study
- ☐ Thesis

Text(s) planned for use:

No assigned texts

Course Instructor (include name, position, teaching load):

Joshua Kelley, Assistant Professor, 50% teaching

Reason for new course:

Most students in biomedical research will perform experiments that make use of microscopy at some point, but are often unprepared to make use of the data generated. This course will serve to prepare our graduate students (and advanced undergraduates) to properly analyze microscopy data. This course was previously offered in Fall of 2017 as a special topics course, BMB 597.

Does the course addition require additional department or institutional facilities, support and/or resources, e.g. new lab facilities, computer support and services, staffing (including graduate teaching assistants), or library subscriptions and resources?

- ◉ No. The department will not request additional resources for this course.
- ○ Yes. Please list additional resources required and note how they will be funded or supported.

What other departments/programs are affected (e.g. course overlap, prerequisites)? Have affected departments/programs been consulted? Any concerns expressed? Please explain.

How often will this course be offered? Will offering this course result in overload salary payments, either through the college or CED, either to the instructor of this course or to anyone else as a result of rearranging teaching assignments?

This course will be offered every other fall, starting with Fall 2019. This will not require overload.

From: Clarissa Henry
To: Joshua Kelley
Subject: Computational Methods in Biology
Date: Friday, January 4, 2019 11:27:50 AM

Hi Josh,

I wanted to confirm with you that Andre Khalil's class, Computational Methods in Biology that was a core GSBSE course from 2005-2018, will no longer be offered. I am very excited that you are offering a course that incorporates MATLAB because that skillset will be incredibly useful for today's GSBSE students.

Best, Clarissa

--
Clarissa Henry
Associate Professor, School of Biology and Ecology
Program Director, Graduate School of Biomedical Sciences and Engineering
University of Maine
Clarissa.Henry@maine.edu
207-581-2816

BMB 520: Introduction to Image Analysis

Course Information:

3 Credit Hours

Instructor: Dr. Joshua Kelley, Assistant Professor, Department of Molecular and Biomedical Sciences

Office Address: Room 312 Hitchner Hall

Email: joshua.b.kelley@maine.edu

Phone: (207) 581-2957

Class Website: Google classroom (classroom.google.com)

Meeting Time: Tuesday/Thursday 9:30 – 10:50 in Shibles 320

Course Objectives: This course aims to provide practical training in extracting data from images for cell and molecular biologists. It will cover how to take images that are to be quantified including documentation of gels/blots and light microscopy, how to process those images, and extract data from them. Students will learn to use Imagej (FIJI) and MATLAB for image analysis. The course will cover approaches to common problems, such as quantifying colocalization and translocation, and segmentation of images. The course will cover generation of graphs in Excel and MATLAB for publication, and generating high quality figures of imaging results in vector graphics software.

A laptop computer will be required for every class. Through much of this course, the students will be engaging in image processing and analysis in class, so a computer to accomplish these things will be important. If you have any difficulty with this requirement, please contact Professor Kelley.

Disclaimer: Dr. Kelley reserves the right to deviate from the syllabus.

Course Schedule

Class #	Topic
Class 1	Course Introduction
Class 2	Intro to Images and Imagej
Class 3	Stacks and Hyperstacks
Class 4	Image Restoration
Class 5	ROIs and Measurements
Class 6	Image Segmentation
Class 7	More Image Segmentation
Class 8	Figure Construction with Vector Graphics
Class 9	Making Figures
Class 10	Case Study: Calculating N/C ratios

Class 11	Imagej Macros
Class 12	Intro to MATLAB
Class 13	Intro to MATLAB
Class 14	MATLAB: Using Loops and Logicals
Class 15	MATLAB: Using Loops and Logicals 2
Class 16	MATLAB: Image Processing Toolbox
Class 17	MATLAB: Images and Masks
Class 18	Case Study: Finding Position of Maxima
Class 19	Ethics of Image Manipulation
Class 20	Custom Algorithm Development
Class 21	Custom Algorithm Development
Class 22	Custom Algorithm Development

Grading and Course Expectations

- 35% Final Project
- 40% Case Studies/ Class Assignments
- 25% participation

Final Project: This will be an image analysis project of your own design, preferably addressing a problem you have in your own research. It will involve an introduction to the scientific and technical question, a description of the image analysis method you are using to solve your problem, and a figure showing the images analyzed and the data analysis results.

Case Studies/Class Assignments: Throughout the semester we will be working on specific image analysis problems, making figures, or other related projects that will be turned in for a grade.

Participation: This course involves significant hands on work in class, and should be thought of as a laboratory course. Attendance is very important, as is engagement in course. If either attendance or engagement is a problem you will be informed that your participation grade will be dropped if participation does not improve.

Grading Scale: Guaranteed minimum Letter grades are assigned on the basis of the total accumulated points:

A	93%	C	73%
A-	90%	C-	70%
B+	87%	D+	67%
B	83%	D	63%
B-	80%	D-	55%
C+	77%	F	Below 55%

Policy Statements:

The following University Policies are available at the U Maine CITL website, https://umaine.edu/citl/teaching-resources-2/required-syllabus-information/

- Academic Honesty Statement
  - Do not claim someone else's work as your own
  - https://umaine.edu/citl/teaching-resources-2/required-syllabus-information/#Academic
- Student Accessibility Services Statement
  - If you need accommodations, these people will help
  - https://umaine.edu/citl/teaching-resources-2/required-syllabus-information/#Accessibility
- Course Schedule Disclaimer
  - Sometimes the schedule has to change
  - https://umaine.edu/citl/teaching-resources-2/required-syllabus-information/#Schedule
- Observance of Religious Holidays/Events
  - Religious holidays are important and you should be able to celebrate yours.
  - https://umaine.edu/citl/teaching-resources-2/required-syllabus-information/#Observance
- Sexual Discrimination Reporting
  - Sexual discrimination is bad, tell someone if it happens.
  - https://umaine.edu/citl/teaching-resources-2/required-syllabus-information/#Reporting_Long

THE UNIVERSITY OF MAINE

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Please return the completed e-form with appropriate signatures and documentation to the Graduate School by saving the form to your desktop and sending as an attachment to graduate@maine.edu. Please include in the subject line 'Course Proposal' and the course designator and number.

GRADUATE PROGRAM/UNIT EDT Instructional Technology COEHD

COURSE DESIGNATOR EDT COURSE NUMBER 532 EFFECTIVE SEMESTER Summer 19

COURSE TITLE Creative and Connected Learning Environments

REQUESTED ACTION

NEW COURSE (check all that apply, complete Section 1, and submit a complete syllabus):

- [ ] New Course
- [x] New Course with Electronic Learning
- [ ] Experimental

MODIFICATION (Check all that apply and complete Section 2):

- [ ] Designator Change
- [ ] Number Change
- [ ] Title Change
- [ ] Description Change
- [ ] Prerequisite Change
- [ ] Credit Change
- [ ] Cross Listing (must be at least 400-level)[1]
- [ ] Other (specify) _____

ELIMINATION:

- [ ] Course Elimination

ENDORSEMENTS

Please sign using electronic signatures. If you do not already have a digital signature, please click within the correct box below and follow the on-screen instructions.

Leader, Initiating Department/Unit(s) Mary E Luce (SCT)

College(s) Curriculum Committee Chair(s) [if applicable] Sherri Hollis

College Dean(s)

Graduate School [sign and date]

1. Courses cross-listed below 400-level require the permission of the Graduate School.

SECTION 1 (FOR NEW COURSE PROPOSALS)

Proposed Catalog Description (include designator, number, title, prerequisites, credit hours):

EDT 532 Creative and Connected Learning Environments
This course is designed for pK-12 educators who are ready to move from learner engagement to learner empowerment. Participants will understand the vital role that creativity plays in problem solving, collaboration, and learning. The course will provide foundational knowledge on strategies to harness educational technology to teach and assess creativity across content areas. Participants will work in depth with technology standards and plan new learning experiences that focus on benefits of creativity and using digital tools to connect beyond the traditional boundaries of classroom walls.
3 credits
No Pre-Req

Components (type of course/used by Student Records for MaineStreet) – *Multiple selections are possible for courses with multiple non-graded components:*

☐ Applied Music ☐ Clinical ☐ Field Experience/Internship ☐ Research ☐ Studio
☐ Laboratory ☒ Lecture/Seminar ☐ Recitation ☐ Independent Study ☐ Thesis

Text(s) planned for use:

Pink, D. H. (2009). Drive: The Surprising Truth About What Motivates Us. New York: Riverhead.
Juliani, A. J. (2015). Inquiry and innovation in the classroom: Using 20% time, genius hour, and PBL to drive student success. New York: Routledge.
Mackenzie, T. (2016). Dive into Inquiry: Amplify Learning and Empower Student Voice. Irvine: EdTechTeam Press.

Course Instructor (include name, position, teaching load):

Mia Morrison - Instructor COEHD 4/4 teaching load

Reason for new course:

We are seeking to expand the number of electives without a pre-req such that we can offer more choices to our own EDT students, and to K-12 educators in other COEHD programs such as Curriculum, Instruction, and Assessment. Additionally, we hope to meet the re-certification needs of classroom teachers who may not be enrolled in a degree program. This course allows a huge range of educators to join.

Does the course addition require additional department or institutional facilities, support and/or resources, e.g. new lab facilities, computer support and services, staffing (including graduate teaching assistants), or library subscriptions and resources?

○ No. The department will not request additional resources for this course.

◉ Yes. Please list additional resources required and note how they will be funded or supported.

This course will likely be taught as an overload given the summer offering. Will be covered through program revenue

What other departments/programs are affected (e.g. course overlap, prerequisites)? Have affected departments/programs been consulted? Any concerns expressed? Please explain.

We only anticipate this course being a beneficial offering for other programs needing online courses in the summer months.

How often will this course be offered? Will offering this course result in overload salary payments, either through the college or CED, either to the instructor of this course or to anyone else as a result of rearranging teaching assignments?

Currently we plan for summer of even years, however, we will monitor demand.

College of Education and Human Development
Graduate Course Proposal Routing Slip

Date October 2, 2018

From: **College of Education of Education & Human Development**

Course Proposals (Write in Course Designator & Title of Course)

Course Prefix and Number	Course Title
EDT 532	Creative and Connected Learning Environments

* *

Please forward to the next person or department on the list below.

Date	Initials/Signature	Name	Role
10/2/18		Johanna Prince	EDT Program Coordinator
10/19/18		Mary Ellin Logue	Chair, School of Learning and Teaching
10/26/18		Sherri Weeks	Chair, COEHD Curriculum Committee
11/14/18		Jim Artesani	Associate Dean of Graduate Education, Research, & Outreach
11/14/18		Tim Reagan	Dean

* *

Sent to (who) _____ in Graduate School on (date) _____ for Graduate Curriculum Committee Review

EDT 532 Creative and Connected Learning Environments

EDT 532
3 Credits
Summer 2019

Mia Morrison
mia.morrison@maine.edu
Office Hours by Appointment

Course Description

This course is designed for pK-12 educators who are ready to move from learner engagement to learner empowerment. Participants will understand the vital role that creativity plays in problem solving, collaboration, and learning. The course will provide foundational knowledge on strategies to harness educational technology to teach and assess creativity across content areas. Participants will work in depth with technology standards and plan new learning experiences that focus on benefits of creativity and using digital tools to connect beyond the traditional boundaries of classroom walls. The learning environment for the course will model different engagement, instructional, and assessment strategies including readings, multiple modes of discussion and reflection, practical applications, design projects, and social networks.

Overview

In the Creative and Connected Learning Environments course, participants will begin by exploring the current technology standards in education to frame and understand their work with students in the classroom. They will explore, reflect upon, and apply pedagogical frameworks around teaching, encouraging and assessing creativity as well as leveraging digital tools and strategies to connect beyond the classroom walls. Participants will consider the promotion and effects of learner engagement, ownership, and empowerment.

1. Plan developmentally appropriate learning experiences that model, teach, and assess creative thinking.
2. Examine the role of collaboration in the creative process.
3. Apply current national technology standards to design learning environments that promote creativity and connections beyond the classroom walls.
4. Demonstrate the ability to plan for learning experiences that move beyond engagement to empowerment.
5. Network with both local and global communities for professional growth.
6. Demonstrate strategies to connect pK-12 students with experts and others outside the classroom walls to enhance learning outcomes; promote ownership, and increase relevance.
7. Engage in reflective practice and goal setting through various modalities.

Course Essential Questions

MEd in Instructional Technology Essential Questions	Domain	EDT Course-Based Essential Questions
How do educators leverage technology to create environments that support the development of diverse skills, and emphasize challenging learning experiences?	Learning Environments	How might we use cognitive principles and conceptual models of technology integration to design effective instruction and assessment?
How can technology enhance teaching and learning partnerships that support and	Teaching and Learning	How might we use technology to enhance real world, collaborative, learner centered education?

promote innovative models of deeper learning?		
How can educators promote an understanding of the social, ethical and legal issues and responsibilities related to a globally connected society?	Digital Citizenship	How might we ensure that educators and learners practice ethical, legal and safe use of technology?
How can educators develop and model pedagogical and andragogical principles of learning to promote professional growth and practice in a globally connected society?	Professional Practice	How might we use knowledge of andragogy and pedagogy to enhance our ability to leverage educational technology for teaching and learning?
How can educators align vision, implementation, and practice to foster learning enhanced by technology?	Leadership	How might we advocate for appropriate use of technology in teaching and learning?
All		How might we use the latest research, personal experiences, and a professional networks to collaborate and model growth mindset?

Student Learning Outcomes

Learning Environments	1	Articulate a personal philosophy of educational practice that demonstrates awareness of educational psychology, cognitive principles, conceptual models for technology integration (i.e. TPACK, SAMR)) and learning theory
Teaching and Learning	2	Demonstrate fluency with new educational tools, and articulate the affordances and constraints of such tools to support educational practice
	3	Plan for educational experience (of K-12 students or adults learners) that demonstrates the ability to use educational technology, sound educational philosophy, and plan for local context
Digital Citizenship	4	List filters for considering new educational tools that demonstrate awareness of ethical, legal, and safety implications of educational technology
Professional Practice	5	Articulate the difference between andragogy and pedagogy
Leadership	6	Through various modalities engage in reflective practice and goal setting
All	7	Read and synthesize literature and research on educational technology to support personal experiences and deepen conceptual knowledge
	8	Engage with peers and professional learning network through a variety of modalities to lead and contribute to discussions on educational technology to support deeper reasoning

Required Readings and Texts

All materials for this course will be made available online through BlackBoard and other learning management tools.

Grading and Course Expectations

- All assignment details, descriptions, rubrics and associated points are posted in BlackBoard.
- Your final grade will be based on your cumulative score on all assignments

- In addition to your required work there will be an active engagement element to your performance in each unit. Regular and meaningful participation is expected.
- A note on extra-credit: I hope all the assignments in this class give you a chance to take your learning to the next step, so I do not provide options for extra credit. If you'd like to propose an alternative assignment to achieve course outcomes, I am open to a discussion. As always, communication is a key element to best outcomes.
- All work is due on the assigned date, please be in contact in advance if there is an emergency to make other arrangements as I do not accept late submissions.

Course Schedule

- There is no final exam.
- Each week will run Monday morning to Sunday evening, midnight.
- Work is due on assigned dates, any exceptions to this schedule must be made in advance. Please note that with online courses, discussion forum participation must be regular and on-going. There is a document on Blackboard the discusses how to be a successful online student.
- I do not accept late work. Please communicate any difficulties BEFORE deadlines for alternate scheduling as needed. There may be no options but let's discuss before it is late.
- BlackBoard will contain a more detailed course schedule with assignments and due dates.

Course Outline

**details subject to change*

Module & Domain	Example Topics
1 Learning Environments & Teaching and Learning	Introductions, ISTE STandards ● Deep dive into the standards ● Exploring differences in the refresh ● WHY the change? ● Alignment/reflection in own practice
2 Professional Practice & Teaching and Learning	Engaged vs Empowered Student ● Defining the difference ● Alignment/reflection in own practice ● Exploring tools and strategies ● Connections to standards
3 Digital Citizenship & Professional Practice	The Global Citizen ● Global citizenship, perspective, and education ● Reflection on own practice and self (as model) ● Promote PLN (various strategies - Twitter #edtech207) ● Methods of outreach, expression and connection ● Creation of lesson that emcompasses both global citizenship and student empowerment that aligns to ISTE standards
4 Teaching and	Creation and Ownership ● Inspiring and assessing creativity

Learning	● Reflection of learning environment, culture ● Research around self selected topic - connection to what is happening in education ● Set goals for next semester/new year
5 Professional Practice, Learning Environments & Leadership	21c Learning Environments ● Space, teaching, learning, connecting in 21c ● Culture and being a catalyst ● Exploration of SAMR and EdTech Quintet ● Final synthesis project ○ amplification of student voice ○ promotion of creativity ○ creating global connections, perspective ○ inspiring lifelong learning ○ teacher created resources ○ alignment to standards (SAMR, EdTQ) ○ connection to research

Grading

● Weekly Assignments (60%) ● Participation / Engagement (10%) ● Capstone (30%)	● A = 94-100 ● A- = 90-93.9 ● B+ = 87-89.9 ● B = 83-86.9 ● B- = 80-82.9 ● C+ = 77-79.9 ● C = 73-76.9 ● C- = 70-72.9 ● D+ = 67-69.9 ● D = 63-66.9 ● D- = 60-62.9 ● F = 0-59.9

Course Schedule Disclaimer In the event of an extended disruption of normal classroom activities, the format for this course may be modified to enable its completion within its programmed time frame. In that event, you will be provided an addendum to the syllabus that will supersede this version.

My Philosophy and Policies

Adult Learners & Goal Setting

It is my desire to meet you, understand your background in education/industry, and your interest in using educational technology. I encourage you to advocate for how this course and each assignment meets your context and professional goals. Please take the opportunity to propose how this course can better meet your goals.

General Information

This course is a graduate course, I assume you are adult learners committed to the course objectives and also that you have busy personal and professional lives. I look forward to supporting you with the creation, development, and plan for your learning. I have clearly

published the course schedule and expect you to manage your learning to meet deadlines and achieve the course outcomes. I am committed to supporting you and am available for virtual or in person meetings.

A few helpful notes:

- This course is an online course.
- Regular engagement with the course materials, learning management tools, and the instructor are expected.
- Each week expect to spend between 10-15 hours of work on your assignments.
- Assignments are expected on the due date.
- I am easily accessible and am happy to check in. I will respond to email questions quickly, and am happy to arrange phone, virtual, or in-person meetings.

Communication

Blackboard and email will be the channels of communication for this course. Blackboard will be used to store all course-related links and documents. https://www.courses.maine.edu/ use your UMS username and password to access the course site**.** I expect you have activated and use your @maine.edu email (or have it forwarded to another account) so you will receive course communications. If you are trying to reach me, email is the best way to contact me.

Technology

This course will use a variety of technologies. It is required that you have access to high-speed internet connection, access to a computer with a modern processor, and the ability to work with different document formats. It is important that you have backup strategies in place to ensure your work is not lost.

Email: dlltechhelp@maine.edu
Work Phone 1.877.947.4357(HELP) or 207.581.4591
Office Location 5 Chadbourne Hall The University of Maine
Office Hours Technical support office hours: 8am to 4:30pm (M-F) during May Term, Summer & Breaks 8am to 6pm (M-Th) & 8am to 5pm (F) during Fall & Spring semesters Limited Email Support Nights, Weekends, School Breaks & Holidays
Notes https://online.umaine.edu/tech-support/

UNIVERSITY POLICIES

Academic Honesty Statement: Academic honesty is very important. It is dishonest to cheat on exams, to copy term papers, to submit papers written by another person, to fake experimental results, or to copy or reword parts of books or articles into your own papers without appropriately citing the source. Students committing or aiding in any of these violations may be given failing grades for an assignment or for an entire course, at the discretion of the instructor. In addition to any academic action taken by an instructor, these violations are also subject to action under the University of Maine Student Conduct Code. The maximum possible sanction under the student conduct code is dismissal from the University.

Students with disabilities statement:

If you have a disability for which you may be requesting an accommodation, please contact Student Accessibility Services, 121 East Annex, 581.2319, as early as possible

in the term. Students who have already been approved for accommodations by SAS and have a current accommodation letter should meet with me (the instructor of the course) privately as soon as possible.
Course Schedule Disclaimer (Disruption Clause): In the event of an extended disruption of normal classroom activities, the format for this course may be modified to enable its completion within its programmed time frame. In that event, you will be provided an addendum to the syllabus that will supersede this version.

Observance of Religious Holidays/Events: The University of Maine recognizes that when students are observing significant religious holidays, some may be unable to attend classes or labs, study, take tests, or work on other assignments. If they provide adequate notice (at least one week and longer if at all possible), these students are allowed to make up course requirements as long as this effort does not create an unreasonable burden upon the instructor, department or University. At the discretion of the instructor, such coursework could be due before or after the examination or assignment. No adverse or prejudicial effects shall result to a student's grade for the examination, study, or course requirement on the day of religious observance. The student shall not be marked absent from the class due to observing a significant religious holiday. In the case of an internship or clinical, students should refer to the applicable policy in place by the employer or site.

Sexual Violence Policy
Sexual Discrimination Reporting
The University of Maine is committed to making campus a safe place for students. Because of this commitment, if you tell any of your teachers about sexual discrimination involving members of the campus, your teacher is required to report this information to the campus Office of Sexual Assault & Violence Prevention or the Office of Equal Opportunity.
Behaviors that can be "sexual discrimination" include sexual assault, sexual harassment, stalking, relationship abuse (dating violence and domestic violence), sexual misconduct, and gender discrimination. Therefore, all of these behaviors must be reported.

Why do teachers have to report sexual discrimination?
The university can better support students in trouble if we know about what is happening. Reporting also helps us to identify patterns that might arise – for example, if more than one victim reports having been assaulted or harassed by the same individual.

What will happen to a student if a teacher reports?
An employee from the Office of Sexual Assault & Violence Prevention or the Office of Equal Opportunity will reach out to you and offer support, resources, and information. You will be invited to meet with the employee to discuss the situation and the various options available to you.

If you have requested confidentiality, the University will weigh your request that no action be taken against the institution's obligation to provide a safe, nondiscriminatory environment for all students. If the University determines that it can maintain confidentiality, you must understand that the institution's ability to meaningfully investigate the incident and pursue disciplinary action, if warranted, may be limited. There are times when the University may not be able to honor a request for

confidentiality because doing so would pose a risk to its ability to provide a safe, nondiscriminatory environment for everyone. If the University determines that it cannot maintain confidentiality, the University will advise you, prior to starting an investigation and, to the extent possible, will share information only with those responsible for handling the institution's response.

The University is committed to the well-being of all students and will take steps to protect all involved from retaliation or harm. If you want to talk in confidence to someone about an experience of sexual discrimination, please contact these resources:
For confidential resources on campus:
Counseling Center: 207-581-1392 or CutlerHealth Center: at 207-581-4000.
For confidential resources off campus: Rape Response Services: 1-800-871-7741 or Spruce Run: 1-800-863-9909.

Other resources:
The resources listed below can offer support but may have to report the incident to others who can help. For support services on campus:
Office of Sexual Assault & Violence Prevention: 207-581-1406
Office of Community Standards: 207-581-1409
University of Maine Police: 207-581-4040 or 911
Or see the OSAVP website for a complete list of services at http://www.umaine.edu/osavp/

UNIVERSITY OF MAINE SYSTEM
STATEMENT OF INTENT TO PLAN

__X__ Graduate
_____ Two-Year
_____ Four-Year

University of Maine

1. Title

Degree: Master of Science
Area: Data Science and Engineering
CIP Code: 30.3001

2. Persons Responsible for Planning

Kate Beard, Graduate Coordinator, Spatial Informatics Programs
Penny Rheingans, Director, School of Computing and Information Science
348 Boardman Hall, University of Maine, Orono, ME 04469-5711

3. General Objective of Proposal

We propose a M.S. degree in Data Science and Engineering as a hybrid degree with both on-line and in-class options. Initially the participating courses will be a mix of in-class and hybrid (in-class-on-line) options with the expectation that over time, a majority of courses will move to hybrid dual or solely on-line versions.

The program includes a set of core courses and a set of domain specializations. Students can focus solely on the Data Science and Engineering core or tailor the degree to a domain specialization. The initial domain specializations we prose to offer include bioinformatics, spatial informatics, and business. To complement both core and domain specializations, some courses may be taken in-class or by distance from other Maine universities if pre-approved for inclusion in graduate student Programs of Study assuming that other program requirements are met.

(1) Program Rationale:

Data science relies on a novel mix of mathematical and statistical modeling, computational thinking and methods, data representation and management, effective information presentation, and consideration for responsible use of data in the context of various fields of domain expertise. Data science requires a deep understanding of how data are acquired and an understanding of the semantics of the data, which strongly influences how data are processed, analyzed, stored, accessed, and presented. Data lineage, data quality, quality assurance, data integration, storage, privacy, and security are all critical topics in a robust data science program. Longer-term

management and reuse of data is also becoming critical, so longer-term curation and data preservation must also be addressed.

Data science and engineering has become a critical skill field for the 21st century. A host of new technologies (advanced computer modelling, smart sensor networks, high-precision lab instruments, wireless telecommunications, smart devices, and social media) are generating data collections at unprecedented rates. There are numerous new applications for such data in engineering, environmental, and social sciences as well as in business, industry, and government. The pervasive application of artificial intelligence (AI) techniques in continuous mining of big data across diverse domains is now viewed as essential by businesses and government in improving decision-making and acquiring insights that were not previously possible.

Data science and engineering addresses the challenges of capturing, curating, managing, processing, analyzing, and translating massive, complex, heterogeneous, and real-time data into manageable forms, new information, and scientific insights. The engineering aspects involve the design and development of information systems and data infrastructure to incorporate and implement the new information and insights. For businesses, governments and academic institutions throughout Maine and beyond there is a growing need for a workforce well trained in exactly such skills

The University of Maine has a solid foundation of existing strengths and resources for developing a Data Science and Engineering M.S. degree offering. The School of Computing and Information Science will provide the initial core course content. Subsequent domain specializations will be developed in collaboration with other units on campus (Department of Electrical and Computer Engineering, Department of Mathematics and Statistics, School of Earth and Climate Sciences, School of Biology and Ecology, School of Marine Science, Department of Civil and Environmental Engineering, Department of Mechanical Engineering, Department of Chemistry, Department of Physics and Astronomy, Department of Psychology, Department of Molecular & Biomedical Sciences, School of Economics, and the College of Business)

(2) General Program Goals:

The objective of the Data Science and Engineering M.S. program is to meet the growing demand for graduates with core skills in managing and analyzing complex data and analytics challenges. The degree will provide a pathway for students from diverse fields to transition to multiple data science career paths by providing them with core graduate level courses across the spectrum of the data lifecycle. In support of the interdisciplinary spirit of data science and engineering, the program is designed to accommodate students from a wide range of undergraduate degrees or other graduate degree backgrounds with options for specialization in different domains.

A collection of hybrid courses with in-class and on-line options will support students in residence as well as meet the needs of people currently in the workforce or otherwise place bound and needing training or retraining in the area of Data Science and Engineering.

(3) Student Outcomes and Behavioral Objectives:

Students will develop knowledge and technical skills in a subset of at least four of the following five thematic areas depending on their backgrounds and interests:

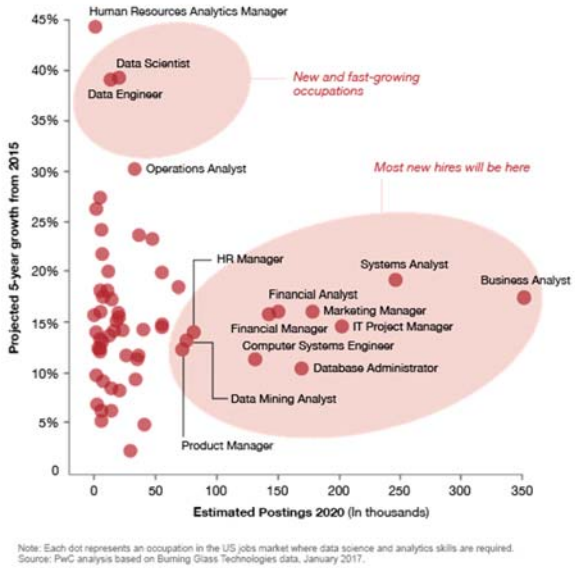
- Data collection technologies
- Data management
- Data analytics
- Data visualization and human computer interaction
- Data security, preservation, and reuse

Students will have an option to complete a 30-credit project-based MS degree, a thesis based MS degree or a 15 credit certificate. Students completing the program will be expected to have familiarity with at least one programming language, data structures and database theory, the concepts for effectively managing data in different systems, (client-server systems, relational and object-oriented databases), have knowledge of statistical and analytical tools (data mining, machine learning), knowledge of effective visualization and presentation of information to different audiences, and knowledge of data security, curation, and preservation strategies.

4. Documented Evidence of Need

(1) Workforce Needs

The importance of data science and engineering to all fields is predicted to grow exponentially and has prompted the launch of cross-agency federal research programs in data science. Six federal departments and funding agencies (NSF, NIH, DoD, DARPA, DoE, and USGS) have prioritized an initiative to accelerate the pace of knowledge discovery in large datasets [1]. In the business world [2], forecasts put the yearly demand for roles relating to data development, data science, and data engineering to reach almost 700,000 openings by 2020. It has also been reported that the United States faces a shortage of more than 140,000 trained personnel to manage and analyze big data [3]. The Business-Higher Education Forum (BHEF) in 2019 projected continuing demand for graduates with data science and analytical skills [4].



[1] Big Data Research and Development Initiative, Obama administration 2012
[2] http://www.forbes.com/sites/siliconangle/2012/02/17/big-data-is-big-market-big-business/

[3] Manyika,J., Chui, M., Brown, B., Bughin,J., Dobbs,R., Roxburgh, C., Hung Byers, A. 2011 Big data: The next frontier for innovation, competition, and productivity. McKinsey Global Institute
[4] https://www.amstat.org/asa/News/New-Report-Highlights-Growing-Demand-for-Data-Science-Analytics-Talent.aspx

(2) Targeted Audiences Related to the Need for Graduate Education in this Field

The advanced knowledge provided by graduate-level data science programs is needed across a wide range of commercial, non-profit, and government settings. Individuals in all areas of private and public enterprise need data science skills for data management, analytics, planning, and decision support. Maine's industry and businesses, such as Kepware Technologies, IDEXX laboratories, Jackson Laboratory, Bath Iron Works, Maine Health Data Organization, Maine's HealthInfoNet, RM Beaumont Corp, Applied Thermal Sciences, and GWI, and startup companies such as CashStar and GreenPages Technology Solution, among many others stand to profit from data science and engineering research. In particular, we address the need for trained data analysts, which Maine's Department of Labor predicts to grow the fastest among all computer-related jobs in Maine.

(3) Similar Programs Offered by Other Universities

Over 30 universities offer an online M.S. degree or certificate in Data Science. Some of these programs offer specializations, such as analytics, artificial intelligence, or data engineering. Part-time and full-time enrollment options are available for on-line data science degrees. Within the New England region, the following data science programs are offered:

Massachusetts: MIT: MicroMasters® program in Statistics and Data Science, Harvard: Graduate Certificate in Data Science. Northeastern, Boston University, UMass Amherst, and UMass Boston all offer graduate certificates in Data Nnalytics and/or Business Analytics. Bay Path University: Master of Science in Applied Data Science.

Connecticut: Central Connecticut State University: Graduate Certificate in Data Mining, Master of Science in Data Mining**;** Wesleyan University: Certificate in Applied Data Science

New Hampshire: New England College: Master of Science in Data Analytics and Business Statistics. Southern New Hampshire University: Master of Science in Data Analytics University of New Hampshire: Graduate Certificate in Data Science, Graduate Certificate in Analytics, Master of Science in Analytics.

Vermont: University of Vermont: Master of Science in Biostatistical Sciences, Masters in Complex Systems and Data Science

Rhode Island: Brown University: Master of Science in Data Science – Campus only

5. A. Which campuses, agencies, organizations, institutions and individuals have you involved in the program?

Individuals contacted on the University of Maine campus are listed under the Personnel Section below. Dr. Matthew Bampton, Professor of Geography/Anthropology at USM has been

contacted about collaboration on the Data Science proposal USM is developing. Dr. Matthew Dube, lead proposer for an undergraduate degree at UMA has been contacted about sharing upper level courses and providing a pathway for students completing the undergraduate degree from UMA to continue in Data Science, through development of a joint 4+1 offering. We envision flexible options for students to include selected courses from other Maine universities (pre-approved, 400 level and above taken in-class or by distance) in their graduate student Programs of Study.

B. Which campuses, agencies, organizations, institutions and individuals do you plan to involve in the program?
All universities in Maine, public and private, that offer academic courses at the 400 level or above that are suitable for inclusion in Data Science and Engineering graduate programs of study will be contacted. We are particularly interested in engaging instructors on these campuses that are able and willing to teach such courses through distance technologies.

C. How?
The School of Computing and Information Science will provide the home for this degree program. Other individuals and units will be consulted on development of program components (team- taught courses, new course development). We propose an interdisciplinary Data Science and Engineering Oversight committee to develop a full proposal and provide guidance for program oversight going forward.

6. What type and/or extent of support is presently available?

Background
Several infrastructure resources already exist to support a strong Data Science and Engineering initiative. The University of Maine has established infrastructure in high-performance networks and computer clusters to support big data research. The Three Ring Binder and the Maine Research and Education network tie together large portions of Maine's network traffic including network traffic for all K-12 schools and nearly all libraries in the state. This network provides a backbone for efficient data distribution and collection.

A. Personnel

Faculty expertise in data science and engineering is distributed across colleges and units. Expertise covers large-scale, complex data management, data semantics, high-performance computing, wireless communications theory, sensor technology, human-computer interactions with data and information, cybersecurity, statistical analysis of spatial and temporal data, along with policy research in data and information science. University of Maine Faculty contacted and indicating interest in participating are listed below.

Faculty	Specialization	Department
Ali Abedi	Wireless Sensor Networks	Electrical and Computer Engineering
Sofian Audrey	Artificial Intelligence, Machine Learning	School of Computing and Information Science

Kate Beard	Geographic Information Science, Spatial Statistics	School of Computing and Information Science
Kathleen Bell	Econometrics	School of Economics
Sudarshan Chawathe	Data Structures, Algorithms	School of Computing and Information Science
Phil Dickens	Cloud Computing, High Performance Computing	School of Computing and Information Science
Max Egenhofer	Database Systems, Spatial-temporal reasoning	School of Computing and Information Science
Sepideh Ghanavati	Data Privacy and Security	School of Computing and Information Science
Nicholas Giudice	Human Computer Interaction	School of Computing and Information Science
Torsten Hahmann	Data Semantics	School of Computing and Information Science
Daniel Hayes	Remote Sensing, Image processing	School of Forest Resources
Shaleen Jain	Engineering Data Analytics	Civil and Environmental Engineering
Nory Jones	Management Information Systems	Maine Business School
Jon Ippolito	New Media	School of Computing and Information Science
Andre Khalil	Computational Biology, Image Analysis	Chemical and Biological Engineering
Ben King	Bioinformatics	Molecular and Biomedical Science
Craig Mason	Biobehavioral informatics and quantitative methods	Education and Applied Quantitative Methods
Brian McGill	Ecoinformatics	School of Biology and Ecology
Cyndy Loftin	Wildlife modeling, Geographic Information Systems	Department of Wildlife
Silvia Nittel	Spatial Databases, Geosensor Networks	School of Computing and Information Science
Harlan Onsrud	Data and Information Policy	School of Computing and Information Science
Nigel Pitt	Mathematics	Chair, Mathematics and Statistics
Nimisha Ranasinghe	Multimodal Sensor Systems	School of Computing and Information Science
Penny Rheingans	Data Visualization	School of Computing and Information Science
Judith Rosenbaum		Journalism and Communication

Roy Turner	Artificial Intelligence	School of Computing and Information Science
Mike Scott	New Media	School of Computing and Information Science
Aaron Weiskettel	Forest modeling	School of Forest Resources
Terry Yoo	Computer Graphics, Image Analysis	School of Computing and Information Science

B. Facilities

Existing research centers and laboratories provide a wealth of resources which may be leveraged to support this degree program. These include:

Geosensor Lab: The Geosensor Lab investigates distributed wireless sensing applications and the role of data stream engines in fast processing of large real time spatio-temporal data streams, and executing stream window queries over them efficiently.

National Center for Geographic Information and Analysis: NCGIA-Maine conducts research on all aspects of geographic information science. Research aims to advance spatial information theories and develop new spatial information technologies that help humans in their everyday lives, in their interaction with the environment, with each other, and with computers, and to generally advance our understanding of spatial and temporal phenomena in our geographic surroundings.

Advanced Computing Group (ACG): The ACG provides computing infrastructure and support. It offers high performance computing resources, cloud computing services, data storage solutions and data management plan assistance. The ACG currently has a supercomputing cluster with 512 processor cores, over 300 TB data storage capacity, a large shared-memory computation server, GPU-accelerators, and a high-performance visualization server.

Virtual Environments and Multimodal Interaction Lab (VEMI): VEMI is a fully integrated research facility combining immersive virtual and augmented reality technology. This research lab supports an integrative approach called neurocognitive engineering, which uses psychophysical techniques to connect theories from human information processing and multimodal spatial cognition to develop and test new technologies. Studies are based on behavioral experiments with human participants in both real environments and virtual reality (VR).

MaineSAIL: The Maine Software Agents and Artificial Intelligence Laboratory takes an agent-based approach to AI, dealing with hardware/software systems that perceive their environment, make decisions about how to behave, and take action. Many of MaineSAIL's projects have as their domain in the intelligent control of autonomous vehicles, for instance autonomous underwater vehicles (AUVs), or multi-AUV systems, such as autonomous oceanographic sampling networks (AOSNs).

Wireless Communication Labs: Wireless sensing leverages resources spread across several departments and research centers. The Maine Center for Next Generation Wireless Communications, consists of four laboratories: the Antenna Characterization Laboratory, the High Power RF and Microwave Circuits Laboratory, the Wireless Communications and Networking Laboratory and the Environmental Testing Laboratory. These four laboratories, in conjunction with the Wireless Sensing Lab (Wise-Net), form the base for wireless communications and networking research at the Electrical and Computer Engineering Department. WiSe-Net Lab hosts the NASA's only large scale (42 ft diameter) inflatable lunar habitat model in the world that is instrumented with passive wireless sensors.

CompuMaine Lab: Current research projects include the use and development of 2D and 3D image analysis, signal processing, and modeling with applications in bio-medicine and astrophysics. The lab has developed new image analysis algorithms capable of extracting quantitative 3D information from high-resolution images of cellular nuclei. As a pilot project, the lab has also started to gather existing mouse and human chromosome territory data from labs in Germany, UK, and US. The major challenge is to perform data analytics on large datasets to investigate biophysical questions of interest, such as calculating the force attracting or repelling chromosomes in interphase nuclei.

C. Equipment

No new equipment is required for support of this program.

D. Library Resources

All enrolled students have access to electronic journals, databases and other resources made available through Fogler Library. Library resources are currently satisfactory for supporting courses and research in Data Science and Engineering, so no additional library resources are currently anticipated. All enrolled tuition-paying distance students will have electronic access to the usual UMaine library resources from their homes and offices.

E. Other

F. What additional new costs are required in any or all of the above categories?

Administrative support within the School of Computing and Information Science is currently managing a full load. Additional administrative support would be needed to help with the management and marketing of this new M.S. degree program.

7. Briefly describe preliminary plans for regular program evaluations, formative and summative.

Reviews of the program and coursework will be overseen by the Data Science and Engineering Oversight committee and the School of Computing and Information Science. Formative and summative evaluations of the program will be carried out consistent with NECHE assessment requirements.

8. Time Frame
Estimated Planning Time: 6 months
Estimated Implementation Time: Anticipated approval ideally in the spring 2019 time frame with September 2019 as a start date for marketing and student recruitment and program initiation in 2020.
Estimate of Program Lifetime: long term

9. COMPLETE FOR GRADUATE PROGRAM ONLY: On what other campus, if any, will this program be available? What plans are there to insure transferability from other campuses into this program or to deliver this program to other campuses?

This graduate program will be open to students on any UMaine campus as allowed and supported within the University of Maine System. UMaine system-wide course cross listing and course transfers are currently being developed and will be implemented for this program as appropriate.

10. Other Pertinent Data and/or Information

Proposed Data Science and Engineering M.S. Degree components

Degree Options: An M.S. degree with options for Project or Thesis in Data Science and Engineering, a Certificate in Data Science and Engineering, 4+ 1 option in Data Science and Engineering

Project-option requirements: 30 credits inclusive of 3 project course or 3 internship credits.
Thesis option requirements: 24 credits of course work and a thesis (6 credits).
Certificate in Data Science and Engineering: 18 credits of course work

Admission Requirements: Students with undergraduate degrees in any field may apply. A successful applicant would be expected to have two semesters of calculus (e.g., MAT 126, 127), a semester of statistics (e.g., MAT 434), and proficiency in programming. Students without these background pre-requisites may be admitted provided they complete one or more of the **Foundation Courses** (listed below) to satisfy any missing skill sets.

Foundation Courses

- SIE507 Information Systems Programming
- One of (Introduction to Statistical Methods in Data Science (2019)
  STS 434 Introduction to Statistics, or ECE 515 Stochastic Processes)
- SIE 505 Formal Foundations for Information Systems

Degree requirements:

DSE XXX Practicum in Data Science - 3 credits

All student will be required to take the Practicum in Data Science. This will be a new interdisciplinary team-taught course that will be structured around an overview of data science and engineering topics and tools as applied to large case study data sets.

Thesis option requirements: Practicum in Data Science (3), a mix of 18 credits covering a minimum of 12 credits from at least four of the five themes (listed below) with remaining credits taken within the core themes or from a domain specialization, SIE501(1), SIE 502(1), INT601 (1) and 6 credits of thesis.

Project option requirements: Practicum in Data Science (3**)**, a mix of 24 credits covering a minimum of 12 credits from at least four of the five themes (listed below) with remaining credits taken within the core themes or from a domain specialization, and internship (3) or project (3).

Certificate option requirements: Practicum in Data Science (3**)**, a mix of 15 credits covering a minimum of 12 credits from at least four of the five themes (listed below) with remaining credits taken within the core themes or from a domain specialization.

Four Plus One Option: Student must apply for admission to the Four Plus One Program before or during the junior year. An applicant should expect to have an overall minimum undergraduate grade point average of 3.25, must have completed the University of Maine General Education Requirement in Math and must have three letters of recommendation from current or previous university instructors. In the senior year, provisionally admitted students must submit the formal application to the Graduate School. Provisionally admitted Four Plus One students with an undergraduate grade point average of 3.25 or better may take up to 9 credits of graduate-level courses in Data Science and Engineering toward the Masters degree which may also count towards the Bachelors degree (joint credits) but they must also be part of the student's Master's Program of Study in Data Science and Engineering. Upon graduation with a bachelors degree, and with satisfactory performance in courses taken as an undergraduate, the student may be formally matriculated into the masters program. Students who meet these requirements must matriculate in their masters program within one semester/term after receiving their bachelors degree in order to use the joint credits.

Data Science and Engineering Core Themes

- Data collection technologies
- Data management
- Data analytics
- Data visualization and human interaction
- Data security, preservation, and reuse

Theme 1: Data collection technologies

- SIE 559 Geosensor Networks
- ECE 484 Communications Engineering
- ECE 585 Foundations Of Wireless Communications
- SFR 609 Remote Sensing Problems
- SVT 531 Advanced Digital Photogrammetry

- SVT 532 Survey Strategies in Use of Lidar

Theme 2: Data Management

- SIE550 Design of Information Systems,
- SIE557 Database Systems Applications,
- COS580 Topics in Database Management Systems
- COS5xx Cloud Computing – Phil Dickens to develop
- SIE 580 Formal Ontologies: Principles and Practice

Theme 3: Data Analytics

- COS554 Algorithms
- STS 531 Mathematical Statistics
- STS 533 Stochastic Systems
- PSE 509 Experimental Design
- SIE 503 Principles of Experimental Design
- COS570 Topics in Artificial Intelligence
- BIO 593 Advanced Biometry
- COS5xx Computer Vision – Terry Yoo to develop
- SIE5xx AI in Data Science – Fall 2019 start
- ECO530 Econometrics
- ECO531 Advanced Econometrics & Applications

Theme 4: Data Visualization and Human Computer Interaction

- SIE515 Human Computer Interaction
- SIE5xx Spatial Interaction Design
- SIE516 Virtual Reality: Research and Applications
- COS5xx Data Visualization – Penny Rheingans to develop

Theme 5: Data security, preservation and reuse

- COS5xx Engineering Privacy In Software Systems - Sepideh Ghanavati to develop
- SIE525 Information Systems Law
- DIG500 Introduction to Digital Curation
- DIG510 Metadata Systems
- DIG 550 Digital Preservation

Domain Specializations
Spatial Informatics

- SIE509 Principles of Geographic Information Sysytem
- SIE510 GIS Applications
- SIE512 Spatial Analysis
- SIE555 Spatial Database Systems
- SIE558 Real-time Sensor Data Streams
- SIE559 Geosensor Networks

- INT 527 Integration of GIS and Remotes Sensing Data Analysis in Natural Resource Applications
- SMS 595 Data Analysis Methods in Marine Sciences

BioInformatics Domain

- BMB 502 Introduction to Bioinformatics
- BMS 625 Foundations of Biomedical Science and Engineering
- ECE 583 Coding and Information Theory

Business Information Domain

- BUA 561 Knowledge Management and Decision Support
- BUA 601 Data Analysis for Business
- BUA 626 Management of Contemporary Organizations

Data Science internship course – 3 credits
Data Science Project course – 3 credits