Term Information

Effective Term	Spring 2023
Previous Value	*Summer 2012*

Course Change Information

What change is being proposed? (If more than one, what changes are being proposed?)

Add course to Number, Nature and Mind Theme

What is the rationale for the proposed change(s)?

Add course to Number, Nature and Mind Theme

What are the programmatic implications of the proposed change(s)?

(e.g. program requirements to be added or removed, changes to be made in available resources, effect on other programs that use the course)?

None

Is approval of the requrest contingent upon the approval of other course or curricular program request? No

Is this a request to withdraw the course? No

General Information

Course Bulletin Listing/Subject Area	Mathematics
Fiscal Unit/Academic Org	Mathematics - D0671
College/Academic Group	Arts and Sciences
Level/Career	Undergraduate
Course Number/Catalog	3350
Course Title	Introduction to Mathematical Biology
Transcript Abbreviation	Intro Math Biology
Course Description	Introduction to quantitative and qualitative analysis of several mathematical models for biological systems.
Semester Credit Hours/Units	Fixed: 3

Offering Information

Length Of Course	14 Week, 12 Week
Flexibly Scheduled Course	Never
Does any section of this course have a distance education component?	No
Grading Basis	Letter Grade
Repeatable	No
Course Components	Lecture
Grade Roster Component	Lecture
Credit Available by Exam	No
Admission Condition Course	No
Off Campus	Never
Campus of Offering	Columbus, Lima, Mansfield, Marion, Newark, Wooster
Previous Value	*Columbus*

Prerequisites and Exclusions

Prerequisites/Corequisites	C- or better in Math 2255, 2415, 5520H; or credit for 255, 415.xx, or 521H.
Exclusions	
Previous Value	Not open to students with credit for 350.
Electronically Enforced	No

Cross-Listings

Cross-Listings

Subject/CIP Code

Subject/CIP Code	27.0101
Subsidy Level	Baccalaureate Course
Intended Rank	Sophomore, Junior

Requirement/Elective Designation

Required for this unit's degrees, majors, and/or minors

Number, Nature, Mind

Previous Value

Required for this unit's degrees, majors, and/or minors

Course Details

Course goals or learning objectives/outcomes

- Understand mathematical basis of biological systems
- Be able to mathematically model biological systems

Previous Value

Content Topic List

- Population dynamics: logistic growth
- Population dynamics: Lotka-Volterra predator-prey model
- Modeling specific diseases (e.g. HIV, cancer)
- Competition model
- Dynamics of a neuron
- Enzyme kinetics
- Cell proliferation and death

Sought Concurrence No

Attachments

- math3350_syllabus.docx: Syllabus

  (Syllabus. Owner: Husen,William J)
- math3350_elo_questionnare NNM.docx: ELO statement

  (Other Supporting Documentation. Owner: Husen,William J)

Comments

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Husen,William J	06/14/2022 12:28 PM	Submitted for Approval
Approved	Husen,William J	06/14/2022 12:28 PM	Unit Approval
Approved	Vankeerbergen,Bernadette Chantal	08/26/2022 10:13 AM	College Approval
Pending Approval	Cody,Emily Kathryn Jenkins,Mary Ellen Bigler Hanlin,Deborah Kay Hilty,Michael Vankeerbergen,Bernadette Chantal Steele,Rachel Lea	08/26/2022 10:13 AM	ASCCAO Approval

Math 3350: Introduction to Mathematical Biology

Template Syllabus

Overview

The progress in the biological sciences over the last several decades has been revolutionary, and it is reasonable to expect that this pace of progress, facilitated by huge advances in technology, will continue in the following decades. Mathematics has historically contributed to, as well as benefited from, progress in the natural sciences, and it can play the same role in the biological sciences. There has been a huge development in the application and study of mathematics in biology in the recent decades. It is important to introduce students to the interdisciplinary field of mathematical biology. This course is such an introduction. Through several case studies, mathematical modeling, analysis, and simulation of biological processes will be conducted, and the basic theory of ordinary differential equation (ODE) and numerical solution to ODEs via programming with MATLAB will be introduced.

The course will meet three days a week, one hour per day. Each week, there will be two hours lecture and one hour computer lab.

There will be a final course project. Topics and material for the projects will be announced in the middle of the semester, and students will be paired with a partner to choose and to work on a project. Each group will write a project report, and is expected to give a project presentation during lecture time near the end of the semester.

Prerequisite

C- or better in Math 2255 and 2415, or 5520H.

Textbook

Introduction to Mathematical Biology by Ching-Shan Chou and Avner Friedman, Springer 2015.

Topics

1. Bacterial growth in chemostat
2. Linear differential equations
3. Systems of two differential equations
4. Predator-prey models
5. Two competing populations
6. General systems of differential equations
7. The chemostat model revisited
8. Spread of disease
9. Enzyme dynamics
10. Bifurcation theory
11. Atherosclerosis
12. Cancer-immune interaction
13. Cancer Virotherapy
14. Turberculosis

Grading
The course grade will be based on the following components.

(1) Theoretical homework 40%
(2) Numerical homework 40%
(3) Final Project 20%

The course letter grade will be with an approximately 90(A)-80(B)-70(C)-60(D) scale.

Academic Misconduct
It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term academic misconduct includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct `http://studentlife.osu.edu/csc/`.

Students with Disabilities
The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: `slds@osu.edu`; 614-292-3307; `slds.osu.edu`; 098 Baker Hall, 113 W. 12th Avenue.

Learning Objectives
The Curriculum Committee of the College of Arts & Sciences requests that syllabi of all GE courses list the goals and learning objectives for the relevant category of the GEC.

The goals of the Number, Nature, and Mind GE Theme are:

1. Successful students will analyze the nature of mathematics and/or mathematical reasoning at a more advanced and in-depth level than in the Foundations component.

2. Successful students will integrate approaches to number, nature, and mind by making connections to their own experience of mathematical thinking and its application in the world, and by making connections to work they have done in previous classes and/or anticipate doing in the future.

3. Successful students will experience and examine mathematics as an abstract formal system accessible to mental manipulation and/or mathematics as a tool for describing and understanding the natural world.

More specifically, the "Expected Learning Outcomes" for this theme are

Successful students are able to:

1.1 Engage in critical and logical thinking about the nature and/or application of mathematical reasoning.

1.2 Engage in an advanced, in-depth, scholarly exploration of the philosophical and/or cognitive foundations of mathematics and/or the application of mathematics in understanding the natural world.

2.1 Identify, describe, and synthesize approaches to or experiences of the role of mathematics and mathematical reasoning in different academic and non-academic contexts.

2.2 Demonstrate a developing sense of self as a learner through reflection, self-assessment, and creative work, building on prior experiences to respond to new and challenging contexts.

3.1 Analyze and describe how mathematics functions as an idealized system that enables logical proof and/or as a tool for describing and understanding the natural world.

The topics at the core of Math 3350 — modeling, analysis, and simulation of biological prosses — are among the excellent examples of mathematics as a tool for describing and understanding the natural world, making them an ideal subject for addressing these objectives.

Students will experience these applications of mathematics to biology — Number to Nature — throughout the lectures, homework assignments, computer labs, and the course project. Students will learn how mathematics functions as a tool for describing and analyzing the natural world. The final course project will expose students to current research, and will invite them to reflect on the role of mathematical reasoning in the study of biological processes. This interplay goes to the heart of the Number, Nature, and Mind theme, illustrating that human application of the abstract language of mathematics can lead to deep understanding and startling predictions about the natural world.

New Theme Course Submission Form

Math 3350: Introduction to Mathematical Biology

Submitted for approval for the new theme Number, Nature, and Mind

Background Statement

Math 3350 is an undergraduate course that introduces students to mathematical biology. The textbook used for this course, *Introduction to Mathematical Biology - Modeling, Analysis, and Simulations*, was written by two of our faculty who have been teaching this course. From the Introduction of the text, "The progress in the biological sciences over the last several decades has been revolutionary, and it is reasonable to expect that this pace of progress, facilitated by huge advances in technology, will continue in the following decades. Mathematics has historically contributed to, as well as benefited from, progress in the natural sciences, and it can play the same role in the biological sciences. For this reason, we believe that it is important to introduce students very early, already at the freshman or sophomore level, with just basic knowledge in Calculus, to the interdisciplinary field of mathematical biology." And Math 3350 is such an introduction.

A typical case study in mathematical biology consists of the following steps.

- Describe a biological process which gives rise to several biological questions where mathematics could be helpful in providing answers.
- Develop a mathematical model that represents the relevant biological process.
- Use mathematical theories and computational methods to derive mathematical predictions from the model.
- Verify that the mathematical predictions provide answers to the biological question.

The model obtained in the above steps then can be used to explore related biological questions.

Math 3350 investigates two sets of case studies. The first set includes chemostat models, predator-prey interaction, competition among species, the spread of infectious diseases, and oscillations arising from bifurcations. The second sets of case studies are from recent and current research of great public health interest that are adapted to the level of students. The topics include the risk of atherosclerosis associated with high cholesterol level, cancer and immune interactions, cancer therapy, and tuberculosis. Through these case studies, basic theory of ordinary differential equations and programming with MATLAB are introduced, and students will experience how mathematical models and their numerical simulations can provide explanations that may guide biological and biomedical research. The mathematical modeling, analysis, and simulation in biological study provides an excellent example of the power of mathematics to explain the natural world, making Math 3350 an ideal course for the *Number, Nature, and Mind* GE Theme.

The 3-credit hour course meets 3 days a week, with two days of theory/lecture and one day of computer lab. For the last two weeks, students are divided into small groups and each group is assigned a research article in mathematical biology and modeling, and they are asked to present a summary and critique of the article based on what they have learned in this course.

Course subject & number

In the remainder of this form, instructions and examples have been set in blue type while the new responses are set in black type.

Overview

Each category of the General Education (GE) has specific learning goals and Expected Learning outcomes that connect to the big picture goals of the program. Expected Learning Outcomes (ELOs) describe the knowledge or skills students should have by the end of the course. Courses in the GE Themes must meet the ELOs common for **all** GE Themes and those specific to the Theme, in addition to any ELOs the instructor has developed specific to that course.

The prompts below provide the goals of the GE Themes and seek information about which activities (discussions, readings, lectures, assignments) provide opportunities for students to achieve the ELO's associated with that goal. The answer should be concise and use language accessible to colleagues outside of the submitting department or discipline. The specifics of the activities matter—listing "readings" without a reference to the topic of those readings will not allow the reviewers to understand how the ELO will be met. However, the panel evaluating the fit of the course to the Theme will review this form in conjunction with the syllabus, so if readings, lecture/discussion topics, or other specifics are provided on the syllabus, it is not necessary to reiterate them within this form.

Goals and ELOs shared by *all* Themes

Goal 1: Successful students will analyze an important topic or idea at a more advanced and in-depth level than the foundations. In this context, "advanced" refers to courses that are e.g., synthetic, rely on research or cutting-edge findings, or deeply engage with the subject matter, among other possibilities.

Goal 2: Successful students will integrate approaches to the theme by making connections to out-of-classroom experiences with academic knowledge or across disciplines and/or to work they have done in previous classes and that they anticipate doing in future.

For each of the ELOs below, please identify and explain course assignments, readings, or other activities within this course that provide opportunity for students to attain the ELO. If the specific information is listed on the syllabus, it is appropriate to point to that document. The ELOs are expected to vary in their "coverage" in terms of number of activities or emphasis within the course. Examples from successful courses are shared on the next page.

ELO 1.1 Engage in critical and logical thinking.	Through lectures, readings, homework, computer lab, and group projects, students will engage in logical thinking as they derive mathematical models for biological processes and as they derive predictions using the models. Students will engage in critical thinking as they reflect on the mathematics theories and computation results that led to explanation and answer to the biological processes and questions.

ELO 2.1 Identify, describe, and synthesize approaches or experiences.	As described in the background statement, each case study in Math 3350 follows the process of modeling, analysing, and simulation. Throughout the course students are challenged to identify these approaches, describe the interplay between mathematics and biology, and explain how the synthesis of theory and computation results leads to answers to biological questions. Students experience this challenge in lectures and reading, in homework assignments, computer labs, and the final project.
ELO 2.2 Demonstrate a developing sense of self as a learner through reflection, self-assessment, and creative work, building on prior experiences to respond to new and challenging contexts.	Development and progression of students in Math 3350 is traced most clearly through the process of each case study. In each of these studies, students • describe a biological process; • build a mathematical model for the process; • use mathematical theory and computation methods to analyse the model and to make prediction; • check that the mathematical predictions provide answers to the biological question. Student reflection and self-assessment occurs through lectures, computer labs, homework, and the course project.

Example responses (from Sociology 3200, Comm 2850, French 2803):

ELO 1.1 Engage in critical and logical thinking.	*This course will build skills needed to engage in critical and logical thinking about immigration and immigration related policy through:* • *Weekly reading response papers which require the students to synthesize and critically evaluate cutting-edge scholarship on immigration;* • *Engagement in class-based discussion and debates on immigration-related topics using evidence-based logical reasoning to evaluate policy positions;* • *Completion of an assignment which build skills in analyzing empirical data on immigration (Assignment #1)* • *Completion 3 assignments which build skills in connecting individual experiences with broader population-based patterns (Assignments #1, #2, #3)* • *Completion of 3 quizzes in which students demonstrate comprehension of the course readings and materials.*
ELO 2.1 Identify, describe, and synthesize approaches or experiences.	*Students engage in advanced exploration of each module topic through a combination of lectures, readings, and discussions.* <u>*Lecture*</u> *Course materials come from a variety of sources to help students engage in the relationship between media and citizenship at an advanced level. Each of the 12 modules has 3-4 lectures that contain information from both peer-reviewed and popular sources. Additionally, each module has at least one guest lecture from an expert in that topic to increase students' access to people with expertise in a variety of areas.*

	Reading *The textbook for this course provides background information on each topic and corresponds to the lectures. Students also take some control over their own learning by choosing at least one peer-reviewed article and at least one newspaper article from outside the class materials to read and include in their weekly discussion posts.* *Discussions* *Students do weekly discussions and are given flexibility in their topic choices in order to allow them to take some control over their education. They are also asked to provide information from sources they've found outside the lecture materials. In this way, they are able to explore areas of particular interest to them and practice the skills they will need to gather information about current events, analyze this information, and communicate it with others.* *Activity Example: Civility impacts citizenship behaviors in many ways. Students are asked to choose a TED talk from a provided list (or choose another speech of their interest) and summarize and evaluate what it says about the relationship between civility and citizenship. Examples of Ted Talks on the list include Steven Petrow on the difference between being polite and being civil, Chimamanda Ngozi Adichie's talk on how a single story can perpetuate stereotypes, and Claire Wardle's talk on how diversity can enhance citizenship.*
ELO 2.2 Demonstrate a developing sense of self as a learner through reflection, self-assessment, and creative work, building on prior experiences to respond to new and challenging contexts.	*Students will conduct research on a specific event or site in Paris not already discussed in depth in class. Students will submit a 300-word abstract of their topic and a bibliography of at least five reputable academic and mainstream sources. At the end of the semester they will submit a 5-page research paper and present their findings in a 10-minute oral and visual presentation in a small-group setting in Zoom.* *Some examples of events and sites:* – *The Paris Commune, an 1871 socialist uprising violently squelched by conservative forces* – *Jazz-Age Montmartre, where a small community of African-Americans–including actress and singer Josephine Baker, who was just inducted into the French Pantheon–settled and worked after World War I.* – *The Vélodrome d'hiver Roundup, 16-17 July 1942, when 13,000 Jews were rounded up by Paris police before being sent to concentration camps* – *The Marais, a vibrant Paris neighborhood inhabited over the centuries by aristocrats, then Jews, then the LGBTQ+ community, among other groups.*

Goals and ELOs of the GE Theme: Number, Nature, and Mind

Course subject & number

GOAL 1: 1. Successful students will analyze the nature of mathematics and/or mathematical reasoning at a more advanced and in-depth level than in the Foundations component.

GOAL 2: Successful students will integrate approaches to number, nature, and mind by making connections to their own experience of mathematical thinking and its application in the world, and by making connections to work they have done in previous classes and/or anticipate doing in the future.

GOAL 3: Successful students will experience and examine mathematics as an abstract formal system accessible to mental manipulation and/or mathematics as a tool for describing and understanding the natural world or human cognition.

Enter your ELOs in the Table below, editing and removing rows as needed. There should be at least one ELO for each goal, and they should be numbered to correspond to the goal (e.g., ELO1.1 is the first ELO for Goal 1, ELO 2.2 would be the second ELO for the second goal).

For each ELOs, please identify and explain course assignments, readings, or other activities within this course that provide opportunity for students to attain the ELO. If the specific information is listed on the syllabus, it is appropriate to point to that document. The number of activities or emphasis within the course are expected to vary among ELOs. Examples from successful courses are shared below.

ELO 1.1 Engage in critical and logical thinking about the nature and/or application of mathematical reasoning.	As described in the syllabus and background statement, students will engage in critical and logical thinking about the application of mathematical reasoning as they derive the model for each biological process and as they analyze the model and make prediction in each biological process. Students will engage in critical thinking about the application of mathematical reasoning as they reflect on how the theory of differential equation is used in modeling biological processes, how the computational methods is used in testing the mathematical models, and how the model is used in making predictions in the biological process. These reflections arise in lecture, in class discussion, in computer labs, and in reflection questions on homework assignments and in the course projectessay (discussed further under ELO 3.1).
ELO 1.2 Engage in an advanced, in-depth, scholarly exploration of the philosophical and/or cognitive foundations of mathematics and/or the application of mathematics in understanding the natural world or human cognition.	Math 3350 engages students in an advanced, in-depth, scholarly exploration of the application of mathematics in understanding biological processes. The theoretical foundation in modeling biological process in this course is differential equations, and the basic tool in analyzing and assessing mathematical models is numerical computation. Basic theory of ordinary differential equation and basic programming in MATLAB for numerical solution of ODEs are introduced.

ELO 2.1 Identify, describe, and synthesize approaches to or experiences of the role of mathematics and mathematical reasoning in different academic and non-academic contexts.	The application of mathematical theory in modeling biological processes and the use of computational methods in analyzing these models have demonstrated a deep interplay between abstract math theory and concrete biological problems. Math 3350 exposes students to the general approch of modeling, analyzing, and tesing to mathematical biology. Throughout the course students are challenged to identify these approaches, describe the interplay between them, and explain how the synthesis of theory and experiment leads to scientific advances. Students experience this challenge in lectures and reading, in class discussion, and in homework assignments and course projects. Examples of the biological problem studied include • bacterial growth in chemostat • predator-prey models • competing populations • spread of disease • enzyme dynamics • atherosclerosis • cancer-immune interaction • cancer virotherapy • turberculosis Students emerge from the course with a understanding of how to apply quantitative reasoning to the everyday world, a strength that will serve them in context beyond academia.
ELO 2.2 Demonstrate a developing sense of self as a learner through reflection, self-assessment, and creative work, building on prior experiences to respond to new and challenging contexts.	Development and progression of students in Math 3350 is traced most clearly through the process of each case study. In each of these studies, students • describe a biological process; • build a mathematical model for the process; • use mathematical theory and computation methods to analyse the model and to make prediction; • check that the mathematical predictions provide answers to the biological question. Student reflection and self-assessment occurs through lectures, computer labs, homework, and the course project.
ELO 3.1 Analyze and describe how mathematics functions as an idealized system that enables logical proof and/or as a tool for describing and understanding the natural world or human cognition.	Mathematics started and has grown with physical science. However, new discoveries and novel applications of mathematics in biology in the last several decades have revealed the new role that mathematics plays in understanding the natural world. Math 3350 provides an opportunity for students to explore these new developments and to experience these new applications of mathematics to biology.

	Spread of disease as an example (HIV, COVID-19, …). A simple model of a disease in a population is divided into three classes, susceptible *S*, infected *I*, and recovered *R*. After some important parameters are defined (infection rate, death rate, … etc.), the dynamics of *S*, *I*, and *R* are modeled by a system of linear differential equations, the so-called SIR model. Basic theory of linear differential equations is followed. Then the mathematics is used in analyzing the SIR model, and the math result is used to explain the nature of the spread of this disease. Students experience these striking applications of mathematics to biology throughout the lectures and readings, homework assignments and labs, and the final project. They learn how mathematics functions as a tool for analyzing the natural world through these applications. This interplay goes to the heart of the Nature, Number, and Mind theme, illustrating that human application of the abstract language of mathematics can lead to startling predictions about the natural world that can then be tested and confirmed by observations and experiments.

Example responses (from History/Religious Studies 3680, Music 3364; Sociology 3200) for the "Citizenship" Theme:

ELO 1.1 Describe and analyze a range of perspectives on what constitutes citizenship and how it differs across political, cultural, national, global, and/or historical communities.	*Citizenship could not be more central to a topic such as immigration/migration. As such, the course content, goals, and expected learning outcomes are all, almost by definition, engaged with a range of perspectives on local, national, and global citizenship. Throughout the class students will be required to engage with questions about what constitutes citizenship and how it differs across contexts.* *The course content addresses citizenship questions at the global (see weeks #3 and #15 on refugees and open border debates), national (see weeks #5, 7-#14 on the U.S. case), and the local level (see week #6 on Columbus). Specific activities addressing different perspectives on citizenship include Assignment #1, where students produce a demographic profile of a U.S-based immigrant group, including a profile of their citizenship statuses using U.S.-based regulatory definitions. In addition, Assignment #3, which has students connect their family origins to broader population-level immigration patterns, necessitates a discussion of citizenship. Finally, the critical reading responses have the students engage the literature on different perspectives of citizenship and reflect on what constitutes citizenship and how it varies across communities.*
ELO 1.2 Identify, reflect on, and apply the knowledge, skills and dispositions required for intercultural competence as a global citizen.	*This course supports the cultivation of "intercultural competence as a global citizen" through rigorous and sustained study of multiple forms of musical-political agency worldwide, from the grass-roots to the state-sponsored. Students identify varied cultural expressions of "musical citizenship" each week, through their reading and listening assignments, and reflect on them via online and in-class discussion. It is common for us to ask probing and programmatic questions about the musical-*

	political subjects and cultures we study. What are the possibilities and constraints of this particular version of musical citizenship? What might we carry forward in our own lives and labors as musical citizens Further, students are encouraged to apply their emergent intercultural competencies as global, musical citizens in their midterm report and final project, in which weekly course topics inform student-led research and creative projects.
ELO 2.1 Examine, critique, and evaluate various expressions and implications of diversity, equity, inclusion, and explore a variety of lived experiences.	*Through the historical and contemporary case studies students examine in HIST/RS 3680, they have numerous opportunities to examine, critique, and evaluate various expressions and implications of diversity, equity, and inclusion, as well as a variety of lived experiences. The cases highlight the challenges of living in religiously diverse societies, examining a range of issues and their implications. They also consider the intersections of religious difference with other categories of difference, including race and gender. For example, during the unit on US religious freedom, students consider how incarcerated Black Americans and Native Americans have experienced questions of freedom and equality in dramatically different ways than white Protestants. In a weekly reflection post, they address this question directly. In the unit on marriage and sexuality, they consider different ways that different social groups have experienced the regulation of marriage in Israel and Malaysia in ways that do not correspond simplistically to gender (e.g. different women's groups with very different perspectives on the issues).* *In their weekly reflection posts and other written assignments, students are invited to analyze the implications of different regulatory models for questions of diversity, equity, and inclusion. They do so not in a simplistic sense of assessing which model is "right" or "best" but in considering how different possible outcomes might shape the concrete lived experience of different social groups in different ways. The goal is not to determine which way of doing things is best, but to understand why different societies manage these questions in different ways and how their various expressions might lead to different outcomes in terms of diversity and inclusion. They also consider how the different social and demographic conditions of different societies shape their approaches (e.g. a historic Catholic majority in France committed to laicite confronting a growing Muslim minority, or how pluralism *within* Israeli Judaism led to a fragile and contested status quo arrangement). Again, these goals are met most directly through weekly reflection posts and students' final projects, including one prompt that invites students to consider Israel's status quo arrangement from the perspective of different social groups, including liberal feminists, Orthodox and Reform religious leaders, LGBTQ communities, interfaith couples, and others.*
ELO 2.2 Analyze and critique the intersection of concepts of justice, difference, citizenship, and how these interact with cultural traditions, structures of power and/or advocacy for social change.	*As students analyze specific case studies in HIST/RS 3680, they assess law's role in and capacity for enacting justice, managing difference, and constructing citizenship. This goal is met through lectures, course readings, discussion, and written assignments. For example, the unit on indigenous sovereignty and sacred space invites students to consider why liberal systems of law have rarely accommodated indigenous land claims and what this says about indigenous citizenship and justice. They also study examples of indigenous activism and resistance around these issues. At the conclusion of the unit, the neighborhood exploration assignment specifically asks students to take note of whether and how indigenous land claims are marked or acknowledged in the spaces they*

	explore and what they learn from this about citizenship, difference, belonging, and power. In the unit on legal pluralism, marriage, and the law, students study the personal law systems in Israel and Malaysia. They consider the structures of power that privilege certain kinds of communities and identities and also encounter groups advocating for social change. In their final projects, students apply the insights they've gained to particular case studies. As they analyze their selected case studies, they are required to discuss how the cases reveal the different ways justice, difference, and citizenship intersect and how they are shaped by cultural traditions and structures of power in particular social contexts. They present their conclusions in an oral group presentation and in an individually written final paper. Finally, in their end of semester letter to professor, they reflect on how they issues might shape their own advocacy for social change in the future.