Date: 30 August 2019

To: Dr. Mark Archambault, Assistant Dean of Academics
Through: Dr. Richard B. Aronson, Department Head, OEMS
From: Dr. Steven M. Lazarus, Program Chair, OEMS
Cc: Dr. George Maul, OEMS UGCC Representative

We seek to increase the number of credits available from one, to a range of one-to-three in the undergraduate research course OCN 4991 B.S. program (Major Code 7080).

The proposed change is in response to a request by the administration to better align our (OEMS) undergraduate programs. The revised OCN research course option is equivalent to the multi-credit Biological Sciences B.S. (Major Code 7284) BIO4991-4994 sequence.
REQUEST TO CHANGE THE REQUIREMENTS FOR A COURSE

Any change, addition or removal of any restriction, or change in credit hours or availability for a course requires this form, accompanied by any supporting documentation, be completed and approved as indicated below.

COLLEGE: Engineering & Science
DEPARTMENT: Ocean Engineering and Marine Science

REQUEST IS FOR CHANGE IN COURSE O C N 4 9 9 1 Undergraduate Research in Oceanography

TO BE INCLUDED IN 20_20_/21_CATALOG
Course changes are effective beginning with the fall term in which they appear in the University Catalog.

IS REQUEST FOR A CHANGE IN THE NAME LISTED ABOVE? □ Yes □ No If yes, requested name __________________________

IS REQUEST FOR A CHANGE IN CREDITS FOR COURSE LISTED ABOVE? □ Yes □ No If yes, current credits □ and □ or
□ Add □ Remove □ Prerequisite □ Corequisite Prefix Prefix Number Number

IS REQUEST TO CHANGE RESTRICTIONS FOR COURSE LISTED ABOVE? □ Yes □ No If yes, please check all that apply:
□ Add □ Remove □ Prerequisite □ Corequisite Prefix Prefix Number Number

□ Add □ Remove □ Other Restrictions* □ Yes □ No If yes, please use box below:

*Other restrictions may include changing the grade mode (PYF, S/B, A-F, CEU), deactivating a course already in the system, majors or class levels restricted from registration, or other restrictions.
Please enter the complete prerequisite/restriction list as it should appear if this change is approved:

Senior standing in major 7080

☐ Yes ☐ No Is this request for the course to be used to measure program-level student learning outcomes?

☐ Yes ☐ No Is this request for the course to satisfy the scholarly inquiry requirement? If yes, attach "Q" materials for review.

☐ Yes ☐ No Will this change impact any existing programs? If yes, attach "Changing Graduation Requirements" form for each program that is impacted.

APPROVALS: Once appropriate department approvals are completed, submit to the Office of Graduate Programs, or Undergraduate Curriculum Committee Chair for placement on agenda.

1) Original Date
2) Department Head/Program Chair Date
3) Dean or Associate Dean Date
4) Chair, Graduate Council Date OR

Chair, Undergraduate Curriculum Committee Date

CATALOG & CURRICULUM MANAGER’S USE ONLY

SCACRSE _SCADETL_ _SCAPREQ_ _SCABASE_ _SCARRES_ _ACATALOG_ Operator Initials Date

DISTRIBUTION
Original – Catalog & Curriculum Manager
Copy – Academic Unit
OCN 4991  Undergraduate Research in Oceanography  Fall/Spring YYYY
Course Syllabus

Class meets:  TBA
Instructor:  TBA  Office Phone: ####  Email:  @fit.edu

Office Hours:  TBA*
*Appointments at other times can be scheduled via email

Prerequisites:  Instructor Permission

Course Description:  Research experience under the direction and supervision of a member of the oceanography faculty. The course may contain a range of research related activities including lab and field work, as well as computational components (e.g., algorithm development and testing). Students will be expected to develop a research plan and outline, collect and/or download data and perform basic research duties such as statistical, biological and chemical analysis, ecological assessment, and the design/construction of support materials for the individual projects.

Grading:

A (90-100%), B (80-89%), C (70-79%), D (60-69%), F (<60%)

Rubric:
Research proposal/plan  15%
Project outline/timeline  10%
Data collection and analysis  25%
Final report  50%
TOTAL  100%

Textbooks/Reading:  May include peer review literature, technical reports, book chapters, etc.

Course Objectives:  The course is designed fulfill, in part, the requisites associated with an undergraduate degree in meteorology – including basic hands-on research. At the end of the course, students will have:

- Honed their data collection (e.g., sampling strategies), analysis and writing skills.
- Refined their critical thinking skills.
- Developed an understanding of the limitations of their datasets.
- Improved their skill set including software packages, lab equipment, instruments, etc.
- Enhanced their scientific professionalism.

Topics Covered:  Variable, depending on instructor and subject area.
Date: 30 August 2019

To: Dr. Mark Archambault, Assistant Dean of Academics
Through: Dr. Richard B. Aronson, Department Head, OEMS
From: Dr. Steven M. Lazarus, Program Chair, OEMS
Cc: Dr. George Maul, OEMS UGCC Representative

We seek to introduce an undergraduate research course option into the ENS BS program (Major Code 7222).

The proposed changes are in response to a request by the administration to better align our (OEMS) undergraduate programs (formerly Marine Biology and OES). The ENS course option is equivalent to the Biological Sciences B.S. (Major Code 7284) BIO4991-4994 sequence.
FLORIDA TECH

New courses are available beginning with the fall term in which they appear in the University Catalog.

<table>
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<th>SUBJECT</th>
<th>EN</th>
<th>NS</th>
<th>COURSE NO.*</th>
<th>CREDIT HOURS</th>
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<td>Fall 2020 (e.g., Fall 2018)</td>
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<td>(e.g., CSE)</td>
<td>(e.g., 1301)</td>
<td>Requires instructor approval</td>
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</table>

CLASS HOURS 15-45/sem  LECTURE HOURS  LAB HOURS N/A  CONTACT HOURS (CEU ONLY) N/A

DEPARTMENT OEMS

<table>
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<tr>
<th>SCHEDULE TYPE</th>
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COLLEGE OF AERONAUTICS—23  COLLEGE OF ENGINEERING AND SCIENCE—30
COLLEGE OF PSYCHOLOGY AND LIBERAL ARTS—25  NATHAN M. BISK COLLEGE OF BUSINESS—24

COMPUTER TITLE  UG Res. in Environ Sci

This course will be entered into the system as: Bi-Level  Cross-Listed  Dual-Numbered  Full-Load  None of these/Standard Listing

CATALOG TITLE  Undergraduate Research

Comprises research experience under the direction and supervision of a member of the faculty. May be repeated for up to a total of 12 credit hours (Requirement: Instructor approval.)

This description has been approved by the catalog office: E. Major  6-13-2019

<table>
<thead>
<tr>
<th>In addition, please attach a course syllabus and/or more detailed description.</th>
</tr>
</thead>
</table>

| GRADES TO BE ISSUED | - A, B, C, D, F  - A, B, C, D, F, CEU/Audit  - CEU  - S, U  - P, F  - Other |

Please indicate old course information and the date/term the course may be removed from the system:

- Yes  - No  Will this course be used to measure program-level student learning outcomes? If yes, review and signature required.
- Yes  - No  Will this course be used to satisfy the scholarly inquiry requirement? If yes, attach "Q" materials for review.
- Yes  - No  Will this course impact any existing program? If yes, attach "Changing Graduation Requirements" form for each program impacted.
- Yes  - No  Will this course be used to satisfy the Cross Cultural (CC) requirement? If yes, attach confirmation memo from QEP2 Committee.

APPROVALS: On completion of description and course number verification, affix appropriate signatures as indicated, and submit to the Office of Graduate Programs, or Undergraduate Curriculum Committee Chair for placement on agenda.

Organizer: Chair, Graduate Council  Date

Department Head/Program Chair: Chair, Undergraduate Curriculum Committee  Date

Dean/Associate Dean: Date

**Chair, APAC

CATALOG & CURRICULUM MANAGER

These changes/additions have been made for the University Catalog and entered into the BANNER term named above.

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</table>

Florida Institute of Technology • Office of the Registrar

150 West University Boulevard, Melbourne, FL 32901-6975 • 321-674-8114 • Fax 321-674-7827

RGR-384-219
ENS 4991  *Undergraduate Research in Environmental Science*  Fall/Spring YYYY

*Course Syllabus*

**Class meets:** TBA

**Instructor:** TBA  
**Office Phone:** ####  
**Email:** @fit.edu

**Office Hours:** TBA*

*Appointments at other times can be scheduled via email*

**Prerequisites:** Instructor Permission

*Course Description:* Research experience under the direction and supervision of a member of the environmental science faculty. The course may contain a range of research related activities including lab and field work, as well as computational components (e.g., algorithm development and testing). Students will be expected to develop a research plan and outline, collect and/or download data and perform basic research duties such as statistical, biological and chemical analysis, ecological assessment, and the design/construction of support materials for the individual projects.

**Grading:**

A (90-100%), B (80-89%), C (70-79%), D (60-69%), F (<60%)

**Rubric:**

- Research proposal/plan 15%
- Project outline/timeline 10%
- Data collection and analysis 25%
- Final report 50%

TOTAL 100%

**Textbooks/Reading:** May include peer review literature, technical reports, book chapters, etc.

**Course Objectives:** The course is designed fulfill, in part, the requisites associated with an undergraduate degree in meteorology – including basic hands-on research. At the end of the course, students will have:

- Honed their data collection (e.g., sampling strategies), analysis and writing skills.
- Refined their critical thinking skills.
- Developed an understanding of the limitations of their datasets.
- Improved their skill set including software packages, lab equipment, instruments, etc.
- Enhanced their scientific professionalism.
Topics Covered: Variable, depending on instructor and subject area.
Date: 30 August 2019

To: Dr. Mark Archambault, Assistant Dean of Academics
Through: Dr. Richard B. Aronson, Department Head, OEMS
From: Dr. Steven M. Lazarus, Program Chair, OEMS
Cc: Dr. George Maul, OEMS UGCC Representative

We seek to introduce an undergraduate research course option into the MET BS program (Major Code 7224).

The proposed changes are in response to a request by the administration to better align our (OEMS) undergraduate programs (formerly Marine Biology and OES). The MET course option is equivalent to the Biological Sciences B.S. (Major Code 7284) BIO4991-4994 sequence.
New courses are available beginning with the fall term in which they appear in the University Catalog.

**FLORIDA TECH**

**ADDBING A NEW COURSE TO THE CURRICULUM**

**SUBJECT**  **M** **E** **T**  **COURSE NO.**  **4991**  **CREDIT HOURS**  **1-3**  **ACADEMIC YEAR TO BE ADDED TO THE FILE**  **Fall 2020**

*Justify level if 1000-level+ and no co- or prerequisites Requires instructor approval*

**CLASS HOURS**  **15-45/sem**  **LECTURE HOURS**  **N/A**  **LAB HOURS**  **N/A**  **CONTACT HOURS (CEU ONLY)**  **N/A**

**DEPARTMENT**  **OEMS**  (e.g., Biological Sciences)

☐ COLLEGE OF AERONAUTICS—23
☐ COLLEGE OF PSYCHOLOGY AND LIBERAL ARTS—25
☐ NATHAN M. BISK COLLEGE OF BUSINESS—24

**SCHEDULE TYPE**  **Undergraduate Research (N)**

(e.g., Lecture, Lab or Special Topics/Project)

☐ COLLEGE OF ENGINEERING AND SCIENCE—30

**COMPUTER TITLE**  **UG RES. IN METEOROLOGY**  (restricted to 25 characters, including spaces)

This course will be entered into the system as:  
Bi-Level ☐  Cross-Listed ☐  Dual-Numbered ☐  Full-Load ☐  None of these/Standard Listing ☐

**CATALOG TITLE**  **Undergraduate Research in Meteorology**

**CATALOG DESCRIPTION OF COURSE**  Restricted to 350 characters, including spaces

Comprises research experience under the direction and supervision of a member of the faculty. May be repeated up to a total of 12 credit hours (Requirement: Instructor approval.)

This description has been approved by the catalog office  
Catalog & Curriculum Manager  
Date  

In addition, please attach a course syllabus and/or more detailed description.

**RESTRICTIONS**

☐ Prerequisite ONLY  ☐ Corequisite ONLY  ☐ BOTH Prerequisite/Corequisite and or or

Course Prefix/Number

☐ Prerequisite ONLY  ☐ Corequisite ONLY  ☐ BOTH Prerequisite/Corequisite and or or

Course Prefix/Number

☐ Prerequisite ONLY  ☐ Corequisite ONLY  ☐ BOTH Prerequisite/Corequisite and or or

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Course Prefix/Number

☐ Prerequisite ONLY  ☐ Corequisite ONLY  ☐ BOTH Prerequisite/Corequisite and or or

Course Prefix/Number

**ADDITIONAL RESTRICTION**  ☐ and ☐ or  **Instructor approval**

(e.g., Major, Class Level, Department Head Approval)

Please indicate old course information and the date/term the course may be removed from the system:

☐ Yes ☐ No  Will this course be used to measure program-level student learning outcomes? If yes, review and signature required.**

☐ Yes ☐ No  Will this course be used to satisfy the scholarly inquiry requirement? If yes, attach "Q" materials for review.

☐ Yes ☐ No  Will this course impact any existing programs? If yes, attach "Changing Graduation Requirements" form for each program impacted.

☐ Yes ☐ No  Will this course be used to satisfy the Cross Cultural (CC) requirement? If yes, attach confirmation memo from QEP2 Committee.

**APPROVALS:** On completion of description and course number verification, affix appropriate signatures as indicated, and submit to the Office of Graduate Programs, or Undergraduate Curriculum Committee Chair for placement on agenda.

Chair, Graduate Council  
Date  

Chair, Undergraduate Curriculum Committee  
Date  

**Chair, APAC**  
Date  

**CATALOG & CURRICULUM MANAGER**

These changes/additions have been made for the University Catalog and entered into the BANNER term named above.

Catalog & Curriculum Manager  
Date  

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150 West University Boulevard, Melbourne, FL 32901-6975 • 321-674-8114 • Fax 321-674-7827

RGR-384-219
MET 4991  
*Undergraduate Research in Meteorology*  
*Course Syllabus*  

**Class meets:** TBA  

**Instructor:** TBA  
**Office Phone:** ####  
**Email:** @fit.edu  

**Office Hours:** TBA*  
*Appointments at other times can be scheduled via email*  

**Prerequisites:** Instructor Permission  

*Course Description:* Research experience under the direction and supervision of a member of the meteorology faculty. The course may contain a range of research related activities including field work as well as computational components (e.g., algorithm development and testing). Students will be expected to develop a research plan and outline, collect and/or download data and perform basic research duties such as statistical analysis, computer programing, data visualization, and software installation.  

**Grading:**  

A (90-100%), B (80-89%), C (70-79%), D (60-69%), F (<60%)  

**Rubric:**  

<table>
<thead>
<tr>
<th>Component</th>
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<td>Final report</td>
<td>50%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>100%</td>
</tr>
</tbody>
</table>

**Textbooks/Reading:** May include peer review literature, technical reports, book chapters, etc.  

**Course Objectives:** The course is designed fulfill, in part, the requisites associated with an undergraduate degree in meteorology – including basic hands-on research. At the end of the course, students will have:  

- Honed their data collection (e.g., sampling strategies), analysis and writing skills.  
- Refined their critical thinking skills.  
- Developed an understanding of the limitations of their datasets.  
- Improved their skill set including software packages, lab equipment, instruments, etc.  
- Enhanced their scientific professionalism.  

**Topics Covered:** Variable, depending on instructor and subject area.
Date: 30 August 2019

To: Dr. Mark Archambault, Assistant Dean of Academics
Through: Dr. Richard B. Aronson, Department Head, OEMS
From: Dr. Steven M. Lazarus, Program Chair, OEMS
Cc: Dr. George Maul, OEMS UGCC Representative

We seek to introduce an undergraduate research course option into the Sustainability B.S. program (Major Code 7039).

The proposed changes are in response to a request by the administration to better align our (OEMS) undergraduate programs. The SUS course option is equivalent to the Biological Sciences B.S. (Major Code 7284) BIO4991-4994 sequence.
New courses are available beginning with the fall term in which they appear in the University Catalog.

**FLORIDA TECH**

This is a request for reactivation of a course in the system. 
☐ Yes ☐ No

**ADDITION TO THE CURRICULUM**

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<tr>
<th>SUBJECT</th>
<th>USG</th>
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<td>(e.g., 1301)</td>
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<td>1-3</td>
<td>Fall 2020</td>
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*Justify level if 1000-level+ and no co- or prerequisites. Requires instructor approval*

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<th>CLASS HOURS</th>
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**DEPARTMENT**

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<td>NATHAN M. BISK COLLEGE OF BUSINESS—24</td>
</tr>
</tbody>
</table>

**COMPUTER TITLE**

| UCRES - IN SUSTAINABILITY | Restricted to 25 characters, including spaces |

This course will be entered into the system as: | Bi-Level ☐ Cross-Listed ☐ Dual-Numbered ☐ Full-Load ☐ None of these/Standard Listing ☐

**CATALOG TITLE**

| Undergraduate Research | UCRES - IN SUSTAINABILITY |

**CATALOG DESCRIPTION OF COURSE**

Restricted to 350 characters, including spaces

Comprises research experience under the direction and supervision of a member of the faculty. May be repeated for up to a total of 12 credit hours (Requirement: Instructor approval.)

This description has been approved by the catalog office.

**EMOZ 6-13-2019**

Catalog & Curriculum Manager Date

In addition, please attach a course syllabus and/or more detailed description.

**REstrictions**

- Prerequisite ONLY ☐
- Corequisite ONLY ☐
- BOTH Prerequisite/Corequisite ☐ and ☐

<table>
<thead>
<tr>
<th>Course Prefix/Number</th>
<th>Prerequisite ONLY</th>
<th>Corequisite ONLY</th>
<th>BOTH Prerequisite/Corequisite</th>
<th>and</th>
<th>or</th>
</tr>
</thead>
</table>

**ADDITIONAL RESTRICTION**

- Yes ☐ No ☐

Instructor approval

(e.g., Major, Class Level, Department Head Approval)

Please indicate old course information and the date/term the course may be removed from the system:

- Yes ☐ No ☐

Will this course be used to measure program-level student learning outcomes? If yes, review and signature required.**

- Yes ☐ No ☐

Will this course be used to satisfy the scholarly inquiry requirement? If yes, attach "Q" materials for review.

- Yes ☐ No ☐

Will this course satisfy any existing programs? If yes, submit "Changing Graduation Requirements" form for each program impacted.

- Yes ☐ No ☐

Will this course be used to satisfy the Cross Cultural (CC) requirement? If yes, attach confirmation memo from QEP2 Committee.

**APPROVALS:** On completion of description and course number verification, affix appropriate signatures as indicated, and submit to the Office of Graduate Programs or Undergraduate Curriculum Committee Chair for placement on agenda.

Chair, Graduate Council Date

Department Head/Program Chair Date

Dean/Associate Dean Date

Chair, Undergraduate Curriculum Committee Date

**Chair, APHC** Date

**CATALOG & CURRICULUM MANAGER**

These changes/additions have been made for the University Catalog and entered into the BANNER term named above.

Catalog & Curriculum Manager Date

**REGISTRAR'S USE ONLY**

- SCACISE
- SCADTL
- SCAPRO
- SCABASE
- ACATALOG

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Florida Institute of Technology • Office of the Registrar

150 West University Boulevard, Melbourne, FL 32901-6975 • 321-674-8114 • Fax 321-674-7827

RGR-384-219
SUS 4991  
*Undergraduate Research in Sustainability*

*Course Syllabus*  

Class meets:  
TBA

Instructor:  
TBA  
Office Phone: ####  
Email: @fit.edu

Office Hours:  
TBA*  
*Appointments at other times can be scheduled via email*

Prerequisites:  
Instructor Permission

Course Description: Research experience under the direction and supervision of a member of the sustainability faculty. The course may contain a range of research related activities including lab and field work, as well as computational components (e.g., algorithm development and testing). Students will be expected to develop a research plan and outline, collect and/or download data and perform basic research duties such as statistical, biological and chemical analysis, ecological assessment, and the design/construction of support materials for the individual projects.

Grading:

A (90-100%), B (80-89%), C (70-79%), D (60-69%), F (<60%)

Rubric:

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Textbooks/Reading: May include peer review literature, technical reports, book chapters, etc.

Course Objectives: The course is designed fulfill, in part, the requisites associated with an undergraduate degree in meteorology – including basic hands-on research. At the end of the course, students will have:

- Honed their data collection (e.g., sampling strategies), analysis and writing skills.
- Refined their critical thinking skills.
- Developed an understanding of the limitations of their datasets.
- Improved their skill set including software packages, lab equipment, instruments, etc.
- Enhanced their scientific professionalism.

Topics Covered: Variable, depending on instructor and subject area.
We seek to remove ENS 3105 (Atmospheric Pollution Lab) from the Environmental Science B.S. program (Major Code 7222).

The proposed change removes a one credit (lab) course that has not been taught since the retirement of Dr. John Windsor in 2014. Since then, we have been substituting either MET 1999 or ENS 4901 (Special Topics: Undergraduate Seminar). This proposed change will reduce the number of credit hours required to 126. The change will not impact the SACs BS evaluation for the program.
The addition or removal of any graduation requirement in a major or minor requires that this form, accompanied by supporting documentation, be completed and approved as indicated below. Incomplete or incorrect forms will not be processed.

COLLEGE: College of Engineering and Science

DEGREE LEVEL: BS

PROGRAM TITLE: Environmental Science

TO BE INITIATED WITH CATALOG YEAR: 2020

CHANGE REQUESTED FOR: □ major program □ minor program

Program changes are effective beginning with the fall term in which they appear in the University Catalog.

□ Yes □ No Will this change impact the program's assessment process? If yes, attach a description of how the assessment will be impacted and the new process.

DESCRIPTION OF REQUESTED CHANGES: Attach a more detailed description and any supporting documentation.

We propose to remove the 1 credit ENS 3105 Atmospheric Pollution Lab.

*This will reduce the total number of curriculum hours for environmental science majors from 127 to 126.

Approvals: On completion of appropriate department approvals, submit form to Chair, Graduate Council, or Chair, Undergraduate Curriculum Committee, for approval below and forward to the Catalog & Curriculum Manager.

Chair, Graduate Council
Date

Chair, Undergraduate Curriculum Committee
Date

REGISTRAR'S USE ONLY

CAPP / Degree Evaluation

Catalog Management System
Date: 30 August 2019

To: Dr. Mark Archambault, Assistant Dean of Academics
Through: Dr. Richard B. Aronson, Department Head, OEMS
From: Dr. Steven M. Lazarus, Program Chair, OEMS
Cc: Dr. George Maul, OEMS UGCC Representative

We seek to remove ENS 3105 (Atmospheric Pollution Lab) from the Meteorology B.S. program (Major Code 7224).

The proposed change removes a one credit (lab) course that has not been taught since the retirement of Dr. John Windsor in 2014. Since then, we have been substituting either MET 1999 or ENS 4901 (Special Topics: Undergraduate Seminar). This proposed change will reduce the number of credit hours required to 126. The change will not impact the SACs BS evaluation for the program.
Florida Institute of Technology

CHANGING GRADUATION REQUIREMENTS IN A MAJOR/MINOR

The addition or removal of any graduation requirement in a major or minor requires that this form, accompanied by supporting documentation, be completed and approved as indicated below. Incomplete or incorrect forms will not be processed.

COLLEGE: College of Engineering and Science  DEPARTMENT: OEMS

DEGREE LEVEL: BS  PROGRAM TITLE: Meteorology

TO BE INITIATED WITH CATALOG YEAR 20_20_21  CHANGE REQUESTED FOR: □ major program  □ minor program  7224

Program changes are effective beginning with the fall term in which they appear in the University Catalog.

☐ Yes  ☐ No  Will this change impact the program's assessment process? If yes, attach a description of how the assessment will be impacted and the new process.

DESCRIPTION OF REQUESTED CHANGES: Attach a more detailed description and any supporting documentation.

We propose to remove the 1 credit ENS 3105 Atmospheric Pollution Lab.

*This will reduce the total number of curriculum hours for meteorology majors from 127 to 126.

Approvals: On completion of appropriate department approvals, submit form to Chair, Graduate Council, or Chair, Undergraduate Curriculum Committee, for approval below and forward to the Catalog & Curriculum Manager.

Original: Richard J. Martin  9/12/19

Date

Chair, Graduate Council

Date

OR

Date

Department Chair, Undergraduate Curriculum Committee

Date

REGISTRAR'S USE ONLY

☐ Yes  ☐ No  Update completed Date  Initials

☐ Yes  ☐ No  Update completed Date  Initials

Florida Institute of Technology • Office of the Registrar
150 West University Boulevard, Melbourne, FL 32901-6975 • (321) 674-8111 • Fax (321) 674-7827

RSG-231-315
Toby Daly-Engel, Ph.D.
Assistant Professor of Marine Biology
Director of the Florida Tech Shark Conservation Lab
150 W. University Blvd.
Melbourne, FL 32901-6975

September 5, 2019

Mark Archambault, Ph.D.
Assistant Dean of Academics
150 W. University Blvd.
Melbourne, FL 32901-6975

Dear Dr. Archambault,

Please find enclosed my materials for the registration of a new class, Elasmobio (Biology of Sharks, Skates, and Rays). This course is an integrated lab-lecture, for which both activities and grading are combined, and is geared towards upper-level students wishing to learn more about and possibly pursue careers involving such animals. It is intended to have both an undergraduate (new class) and graduate (reactivated class) section that will meet concurrently, with overlapping but distinct expectations for students (see syllabus). It is my hope that these courses will provide a world-class specialized education for our students in the biology and management of a poorly understood group of ancestral fishes with high conservation concern.

Please let me know if you have any questions, and thank you for your time.

[Signature]

Toby Daly-Engel
New courses are available beginning with the fall term in which they appear in the University Catalog.

<table>
<thead>
<tr>
<th>SUBJECT</th>
<th>M A R</th>
<th>COURSE NO.*</th>
<th>4 0 1 3</th>
<th>CREDIT HOURS</th>
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<th>ACADEMIC YEAR TO BE ADDED TO THE FILE</th>
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*Justify level if 1000-level and no co- or prerequisites

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<th>Lecture &amp; Lab (C)</th>
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<tr>
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<td>(e.g., Lecture, Lab or Special Topics/Project)</td>
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<td>NATHAN M. BISK COLLEGE OF BUSINESS—24</td>
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<tr>
<th>CATALOG DESCRIPTION OF COURSE</th>
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Studies the evolution, taxonomy, ecology, behavior and physiology of sharks, skates and rays. Laboratories supplement lecture material. Class meets with MAR 5013.

This description has been approved by the catalog office.

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<th>GRADES TO BE ISSUED</th>
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<td>S, U</td>
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<tr>
<td>P, F</td>
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<td>Other</td>
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In addition, please attach a course syllabus and/or more detailed description.

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<th>RESTRICTIONS</th>
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<tr>
<th>ADDITIONAL RESTRICTION</th>
<th>and</th>
<th>or</th>
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Please indicate old course information and the date/term the course may be removed from the system:

<table>
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<tr>
<th>Yes</th>
<th>No</th>
<th>Will this course be used to measure program-level student learning outcomes? If yes, review and signature required.*</th>
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<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>Will this course be used to satisfy the scholarly inquiry requirement? If yes, attach &quot;Q&quot; materials for review.</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>Will this course impact any existing programs? If yes, attach &quot;Changing Graduation Requirements&quot; form for each program impacted.</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>Will this course be used to satisfy the Cross Cultural (CC) requirement? If yes, attach confirmation memo from QEP2 Committee.</td>
</tr>
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**Chair, APAC**

APPROVALS: On completion of description and course number verification, affix appropriate signatures as indicated, and submit to the Office of Graduate Programs, or Undergraduate Curriculum Committee Chair for placement on agenda.

<table>
<thead>
<tr>
<th>Originator</th>
<th>Richard P. Boland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>8/27/19</td>
</tr>
<tr>
<td>Chair, Graduate Council</td>
<td>Date</td>
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</table>

<table>
<thead>
<tr>
<th>Department Head/Program Chair</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Richard P. Boland</td>
<td>9/20/19</td>
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<table>
<thead>
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<th>Dean of Associate Dean</th>
<th>Date</th>
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</table>

Florida Institute of Technology • Office of the Registrar
150 West University Boulevard, Melbourne, FL 32901-6975 • 321-674-8114 • Fax 321-674-7827

RGR-384-219
Elasmobiology (MAR4100/5511)
Fall 2019

Instructor: Dr. Toby Daly-Engel
Office: OLS 204 (inside my lab, OLS 205, so please wear closed-toed shoes)
Office phone: (321) 674-6155
Email: tdalyengel@fit.edu

Office hours: Monday and Friday from 2-3pm, Wednesday from 10-12pm, and by appointment

Important dates: Last day to drop: Aug 28th; last day to withdraw: Oct 25th

Recommended text: Helfman, Collette, Facey, and Bowen 2009, The Diversity of Fishes: Biology Evolution, and Ecology, 2nd Ed.

Course description: Elasmobiology (Biology of Sharks, Skates, and Rays) is an upper level undergraduate and graduate course focusing on the extant diversity of elasmobranch fishes, their evolution, ecology, and conservation, and is especially geared towards students wishing to learn more about and possibly pursue careers involving these animals. This course is an integrated lab-lecture, for which both activities and grading are combined. Each week will focus on a different facet of elasmobranch biology, and will feature a combination of lectures, guest speakers, paper discussions, wet labs, field trips, and other activities.

Course goals: Students will learn form, function, physiology, and behavior of different species of elasmobranchs via comparison with bony fishes, emphasizing evolutionary history, diversity, and adaptations to different habitats. We will also address contemporary challenges associated with elasmobranch fisheries, and discuss the current tools used in shark conservation, with specific attention to molecular methods and telemetry. By the end of this course, students will be able to identify the main elasmobranch species that occur in Florida’s Atlantic waters, and will be familiar with the variety of methods used to study them. Students will also meet a number of scientists in the field of Elasmobranch Biology, with discussions on the different types of jobs available and professional development.

Grading System:
Attendance and participation 5%
Lab notebook 10%
Paper presentation and discussion 15%
Article summaries 20%
Midterm and final exams (25% each x 2) 50%
Total 100%

A: 90-100%  B: 80-89%  C: 70-79%  D: 60-69%  F: < 59%

The instructor reserves the right to scale UP final grades.

Classwork:
1) Attendance and participation (5% of grade): High student performance is strongly correlated with regular class attendance. You get two unexcused absences before you start losing points,
If you know that you will miss class, please contact the Dean of Students, Dr. Rodney Bowers (rbowers@fit.edu, 321-674-8080) with your university-approved excuse (illness, personal issue, etc.), who will keep your personal information confidential and contact your instructors for you. Participation points will be given for students who actively contribute to weekly discussions, and for miscellaneous activities throughout the semester. At the end of the semester, attendance and participation will be adjusted to 5% of the final grade.

2) **Lab notebooks (10% of grade):** You will keep a notebook and record in it everything you do in lab, including but not limited to notes, handouts, assignments, and sketches. You will turn in your notebook twice during the semester, once during the midterm and once during the final; this is how I will assess your level of participation in the lab, aside from attendance.

3) **Article presentation and discussion (15% of grade):** Each week that a paper discussion is scheduled, a student will be in charge of giving a 7-10 minute presentation on the main points of the paper (Powerpoint or other media optional) and leading a discussion for the remainder of the class period. **Graduate students will each lead two paper discussions over the course of the semester, and undergrads will each lead one.** Paper discussions marked by an asterisk on the schedule must be led by a graduate student. For more information, see the document “Article presentation and discussion assignment” in Canvas in the “General Course Info” module.

4) **Weekly paper summaries (20% of grade):** Each week that a paper discussion is scheduled, each student must turn in a summary of the manuscript in question to the dropbox vor that assignment on Canvas by **11:59pm on the Thursday preceding the Friday discussion.** Summaries should be one page, single-spaced, with 1” margins and 12 pt font. All summaries will be graded, subject to scanning by Turnitin anti-plagiarism software, and the lowest score will be dropped at the end of the semester. For specific instructions, see “How to summarized a research article” in Canvas in the “General Course Info” module.

5) **Exams (25% of grade each, 50% total):** There will be two non-cumulative essay exams over the course of the semester, one midterm and one final. If you miss an exam due to a university approved excuse, you must notify the instructor (phone or e-mail is fine) BEFORE the scheduled exam time and date in order to reschedule an exam. Students who fail to notify the instructor of their absence will not be allowed to make up the exam. If you are very ill and unable to contact the instructor yourself, get someone to do so on your behalf. You will also need a **same-day doctor’s note** in the case of illness, or a note from your advisor in the case of a family emergency. If you miss an exam for any reason you MUST contact me within 48 hours to schedule a make-up exam. Failure to do so will result in a zero. If you have a problem with an exam grade, you must speak with me about it within one week of that exam grade being released. Anyone found with an electronic device or phone out in an exam, regardless of whether it was being used to cheat, will get a zero for that exam.

6) **Expectations for graduate students:** Aside from the two article presentations, graduate students will be required to submit a literature review, the contents of which will be discussed in a separate meeting. The grading scheme for graduate students is:

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance and participation</td>
<td>5%</td>
</tr>
<tr>
<td>Lab notebook</td>
<td>10%</td>
</tr>
<tr>
<td>Paper presentation and discussion</td>
<td>15%</td>
</tr>
<tr>
<td>Article summaries</td>
<td>15%</td>
</tr>
</tbody>
</table>
Midterm and final exams (20% each x 2) 40%
Term paper 15%
Total 100%

**General course policies:** There is no extra credit given in this class. No computers of any kind are permitted in class (for reasons why, come talk to me, but you should also read this: http://m.theatlantic.com/technology/archive/2014/05/to-remember-a-lecture-better-take-notes-by-hand/361478/). The instructor is available during office hours, by appointment, via phone, and via email during normal business hours (9am - 5pm, Mon - Fri). Emails received over the weekend will be returned the following week. *The instructor will not respond to an emailed question if the answer to that question is in the syllabus.*

**Lecture notes:** To be successful in this course, it is recommended that you read the suggested background material for each week, and take thorough handwritten notes each class. To facilitate this, the lecture notes will be posted on Canvas prior to class so that you can download and print them, as well as background reading when possible.

**Canvas:** You are responsible for all materials posted in Canvas. I will also reach out to you frequently via email, so please check your Florida Tech email at least once a day.

**Academic integrity/plagiarism:** You are expected to abide by the University's Code of Conduct (https://www.fit.edu/title-ix/policies/code-of-conduct/). If your written work is plagiarized or if you give or receive assistance from another student on an examination, you will be given a zero for that task or, in extreme circumstances, a zero for the course. Plagiarism includes turning in work for this class that was previously turned in to another class at FIT or elsewhere. Read more on our academic honesty policies at http://web2.fit.edu/studenthandbook/print.php#policy_2490. All written assignments will be assessed via Turnitin.

**Title IX:** Title IX of the Educational Amendments Act of 1972 is the federal law prohibiting discrimination based on sex under any education program and/or activity operated by an institution receiving and/or benefiting from federal financial assistance. Behaviors that can be considered “sexual discrimination” include sexual assault, sexual harassment, stalking, relationship abuse (dating violence and domestic violence), sexual misconduct, and gender discrimination. You are encouraged to report these behaviors.

**Reporting:** Florida Tech 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 complainant reports having been assaulted or harassed by the same individual. Florida Tech is committed to providing a safe and positive learning experience. To report a violation of sexual misconduct or gender discrimination, please contact Security at 321-674-8111. *Please note that as your professor, I am required to report any incidences to Security or to the Title IX Coordinator (321-674-8700). For confidential reporting, please contact CAPS at 321-674-8050.*

**Active shooter preparedness:** In each classroom you enter, look for the two nearest exits anywhere you go, have an escape path in mind, and identify places you could hide. In an emergency, take the following steps: 1) RUN. Getting away from the shooter or shooters is the top priority. Leave your things behind and run away. If it is safe, warn others nearby. Call 911 when you are safe. Describe each shooter, their locations, and weapons. 2) HIDE. If you can’t get away safely, find a place to hide. Get out of the shooter’s view and stay very quiet. Silence your electronic devices and make sure they won’t vibrate. Lock and block doors, close blinds, and turn off the lights. Don’t hide in groups- spread out along walls or hide separately to make it
more difficult for the shooter. Try to communicate with police silently—through text messages or by putting a sign in an exterior window. Stay in place until law enforcement gives you the all clear. 3) FIGHT. Your last resort when you are in immediate danger is to defend yourself. Commit to your actions and act aggressively to stop the shooter. Ambushing the shooter together with makeshift weapons such as chairs, fire extinguishers, scissors, and books can distract and disarm the shooter. For more information, see https://www.ready.gov/active-shooter.

### Tentative Course Schedule, revised 8/23/19

Students are responsible for keeping track of any changes announced in class

<table>
<thead>
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<th>Week</th>
<th>Day</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Mon Aug 19</td>
<td>Introduction to the Biology of Sharks, Skates, and Rays</td>
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<tr>
<td></td>
<td>Weds Aug 21</td>
<td>Fish classification, systematics, and diversity</td>
</tr>
<tr>
<td></td>
<td>Fri Aug 23</td>
<td>Internal and external anatomy</td>
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<tr>
<td></td>
<td></td>
<td>Buoyancy and respiration</td>
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<tr>
<td>2</td>
<td>Mon Aug 26</td>
<td>Lecture/Wet lab: Comparative anatomy</td>
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<tr>
<td></td>
<td>Weds Aug 28</td>
<td>Sensory systems</td>
</tr>
<tr>
<td></td>
<td>Fri Aug 30</td>
<td></td>
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<tr>
<td>3</td>
<td>Mon Sept 2</td>
<td>LABOR DAY, No Classes</td>
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<tr>
<td></td>
<td>Weds Sept 4</td>
<td>Guest speaker: Steve Kajiura, Sensory physiology</td>
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<td></td>
<td>Fri Sept 6</td>
<td>*Paper discussion: Kajiura &amp; Fitzgerald 2009</td>
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<tr>
<td>4</td>
<td>Mon Sept 9</td>
<td>Reproduction</td>
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<td></td>
<td>Weds Sept 11</td>
<td>Lecture/Wet Lab: Mating strategies and reproductive anatomy</td>
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<td></td>
<td>Fri Sept 13</td>
<td>Paper discussion: TBA</td>
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<tr>
<td>5</td>
<td>Mon Sept 16</td>
<td>Predator-prey interactions</td>
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<tr>
<td></td>
<td>Weds Sept 18</td>
<td>Guest speaker: Dean Grubbs, Trophic cascades/osteology</td>
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<tr>
<td>6</td>
<td>Mon Sept 23</td>
<td>Swimming, feeding, and diet</td>
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<td></td>
<td>Weds Sept 25</td>
<td>Guest speaker: Lisa Whitenack, Paleobiology and biomechanics</td>
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<td></td>
<td>Fri Sept 27</td>
<td>Paper discussion: Whitenack &amp; Motta 2010</td>
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<td>Mon Sept 30</td>
<td>Thermo- and osmoregulation</td>
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<td></td>
<td>Weds Oct 2</td>
<td>Guest speaker: Yannis Papastamatiou, Shark social systems</td>
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<td></td>
<td>Fri Oct 4</td>
<td>*Paper discussion: Papastamatiou et al. 2013</td>
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<td>Mon Oct 7</td>
<td>Guest speaker: David Shiffman, Science communication</td>
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<td>Weds Oct 9</td>
<td>Midterm exam and lab practical (Weeks 1-7)</td>
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<td>Fri Oct 11</td>
<td>Paper discussion: Shiffman et al. 2017</td>
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<td>COLUMBUS DAY, No Classes</td>
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<td>Weds Oct 16</td>
<td>Field trip to HBOI to visit Matt Ajemian, Feeding ecology</td>
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<td>Mon Oct 21</td>
<td>Ecology and sampling methods</td>
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<td></td>
<td>Weds Oct 23</td>
<td>Guest speaker: Nick Whitney, Stress response and captive sharks</td>
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<td>Fri Oct 25</td>
<td>Paper discussion: TBA</td>
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<td>11</td>
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<td>Molecular ecology and dispersal</td>
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<td>Fri Nov 1</td>
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<td>12</td>
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<td>Conservation genetics</td>
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<td>Weds Nov 6</td>
<td>Guest speaker: Kara Yopak, Shark brains</td>
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<td>Fri Nov 8</td>
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<td>13</td>
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<td>Fri Nov 15</td>
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<td>Mon Nov 18</td>
<td>Elasmobranch fisheries</td>
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<td>Weds Nov 20</td>
<td>Guest speaker: Eric Reyier, Monitoring IRL shark populations</td>
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<td></td>
<td>Fri Nov 22</td>
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<td>15</td>
<td>Mon Nov 25</td>
<td>TBA</td>
</tr>
<tr>
<td></td>
<td>Weds Nov 27</td>
<td>THANKSGIVING, No Classes</td>
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<td></td>
<td>Fri Nov 29</td>
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<tr>
<td>16</td>
<td>Mon Dec 2</td>
<td>Conservation and management</td>
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<tr>
<td></td>
<td>Weds Dec 4</td>
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<td></td>
<td>Fri Dec 6</td>
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<td></td>
<td><strong>Tuesday Dec. 10, 1-3pm: Final Exam (Weeks 8-16)</strong></td>
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* Mandatory graduate student-led discussion

**Background reading, by week**

1) Helfman et al. 2009, Chapter 3-4 & 11-12; Carrier et al. 2004, Ch. 2
2) Helfman et al. 2009, Ch. 5-6; Carrier et al. 2004, Ch. 12
3) Helfman et al. 2009, Ch. 6; Carrier et al. 2010, Ch. 9
4) Helfman et al. 2009, Ch. 7 & 21; Carrier et al. 2004, Ch. 7
5) Helfman et al. 2009, Ch. 19-20; Carrier et al. 2004, Ch. 17; Carrier et al. 2010 Ch. 7
6) Helfman et al. 2009, Ch. 8; Carrier et al. 2004, Ch. 1 & 5
7) Carrier et al. 2004, Ch. 10; Hamlett 2005, Ch. 3; Carrier et al. 2010, Ch. 10
8) Carrier et al. 2010, Ch. 13; Carrier et al. 2018 Ch. 16
9) Carrier et al. 2010, Ch. 8; Carrier et al. 2018, Ch. 1
10) Carrier et al. 2010, Ch. 8; Carrier et al. 2018, Ch. 8 & 19
11) Carrier et al. 2010, Ch. 3; Carrier et al. 2018, Ch. 13
12) Avise 2004, Ch. 9; Carrier et al. 2018, Ch. 9 & 15
13) Carrier et al. 2018, Ch. 14
14) TBA
15) TBA
16) Carrier et al. 2010, Ch. 2; Carrier et al. 2018, Ch. 16-17
Supporting texts

Discussion Papers

