Course Information

Course Code: 2360776
Course Section: 1
Course Title: COHERENT SHEAVES IN ALGEBRAIC GEOMETRY
Course Credit: 3
Course ECTS: 8.0

Course Catalog Description:

Prerequisites:
No prerequisites

Schedule:
Not available

Instructor Information

Name/Title: Assoc.Prof.Dr. EMRE COŞKUN
Office Address: M-218
Email: emcoskun@metu.edu.tr
Personal Website: http://users.metu.edu.tr/emcoskun/
Office Phone: 210 2996
Office Hours: Fri 10:40-12:30

Course Objectives

Coherent sheaves and derived categories form an indispensable component of every researcher's toolbox in modern algebraic geometry. The objective of this course is to give students the basics of these tools.

Course Learning Outcomes

By the end of the course, a student will have learned:

- Chern classes of coherent sheaves and how to calculate them
- construction methods for coherent sheaves
- properties of moduli spaces of sheaves
- definition and properties of derived categories
- quivers and quiver representations, Gabriel's theorem, relations to derived categories of algebraic varieties

Tentative Weekly Outline

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Relevant Reading</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Weeks 1-2: Vector bundles on projective space</td>
<td>Okonek, Spindler, Schneider (OSS): Chapter 1</td>
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<tr>
<td>2</td>
<td>Weeks 3-5: (Semi)stability and moduli spaces</td>
<td>OSS, Chapter 2</td>
<td>Huybrechts, Lehn (HL): Chapters 1, 2, 4</td>
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<td>3</td>
<td>Week 6: Construction methods</td>
<td>HL, Chapter 5</td>
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<tr>
<td>4</td>
<td>Weeks 7-9: Derived categories</td>
<td>Huybrechts, Chapters 1-3</td>
<td></td>
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<tr>
<td>5</td>
<td>Weeks 10-11: Fourier-Mukai functors</td>
<td>Huybrechts, Chapters 4-7</td>
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</tbody>
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Week 6: Quivers and quiver representations

**Relevant Reading**

An Introduction to Quiver Representations, Derksen and Weyman, Chapters 1-3

**Assignments**

**Course Textbook(s)**


**Course Material(s) and Reading(s)**

*Material(s)*

None.

*Reading(s)*

Any readings outside of the course textbooks will be announced in class.

**Supplementary Readings / Resources / E-Resources**

*Readings*

Any readings outside of the course textbooks will be announced in class.

**Assessment of Student Learning**

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Dates or deadlines</th>
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</thead>
<tbody>
<tr>
<td>Homeworks that will be announced in class and will be collected after a period of two weeks.</td>
<td></td>
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<tr>
<td>Take-home final exam.</td>
<td></td>
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</table>

**Course Grading**

<table>
<thead>
<tr>
<th>Deliverable</th>
<th>Grade Points</th>
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</thead>
<tbody>
<tr>
<td>Homeworks</td>
<td>50</td>
</tr>
<tr>
<td>Final</td>
<td>50</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
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**Information for Students with Disabilities**

To obtain disability related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the ODTÜ Disability Support Office as soon as possible. If you need any accommodation for this course because of your disabling condition, please contact me. For detailed information, please visit the website of Disability Support Office: [http://engelsiz.metu.edu.tr/](http://engelsiz.metu.edu.tr/)

**Academic Honesty**

The METU Honour Code is as follows: "Every member of METU community adopts the following honour code as one of the core principles of academic life and strives to develop an academic environment where continuous adherence to this code is promoted. The members of the METU community are reliable, responsible and honourable people who embrace only the success and recognition they deserve, and act with integrity in their use, evaluation and presentation of facts, data and documents."