The University Of Toledo

NEW COURSE PROPOSAL

1. College: [ARS]
   Department: [EEES]

2. Contact Person: [Richard Becker]
   Phone: 530-4571
   Email: richard.becker@utoledo.edu

3. Alpha/Numeric Code (Subject area - number): EEES 5490

4. Proposed title:
   REMOTE SENSING OF THE ENVIRONMENT

   Proposed effective term: FALL 2010

5. Planned enrollment per section: 20 per term: 20

6. Is the course cross-listed with another academic unit? Yes  No

   Is the course offered at more than one level? Yes  No

   If yes to either question, please list additional Alpha/Numeric codes, and
   submit a separate New Course form or Course Modification form for the
   course(s) referenced below.

   a. EEES 4490
   b. GEPL 1490
   c. GEPL 5490

   Approval of other academic unit (signature): [Signature]

   Name and title: Dr. Peter Lindquist, Prof. and Chair, GEPL

   If course is to be offered at more than one level, attach an explanation of
   the different requirements that students must meet for each level. If the
   requirements are the same for each level, justification must be provided.

7. Credit hours: Fixed: 4 or Variable: 10

8. Delivery Mode:
   a. Activity Type:
      *Choices are: Lecture, Recitation, Seminar, Regular Lab, Open Lab, Studio, Clinic, Field, Independent Study, Workshop, Computer Assisted Instruction, Other

     Primary  Secondary  Tertiary
     Lecture  [ ]  [ ]  [ ]
     Minimum Credit Hours [ ] [ ] [ ]
     Maximum Credit Hours [ ] [ ] [ ]
     Weekly Contact Hours [ ] [ ] [ ]
9. Terms offered: ☑ Fall ☐ Spring ☐ Summer

Years offered: ☐ Every Year ☐ Alternate Years

10. Are students permitted to register for more than one section during a term? ☐ No ☑ Yes

May the courses be repeated for credit? ☐ No ☑ Yes

Maximum Hours:

11. Grading System: Undergraduate

Normal Grading (A-F, PS/NC, PR, I)
Passing Grade/No Credit (A-C, NC)
Credit/No Credit
Grade Only (A-F)
Audit only
No Grade

Graduate

Normal Grading (A-F, PS/NC, PR, I)
Grade Only (A-F)
Satisfactory/Unsatisfactory (G only)
Audit only
No Grade

12. Prerequisites (must be taken before):

a. GEPL - 3550
b. EEES - 2100

Co-requisites (must be taken together):

a. PIN (Permission From Instructor)

PDP (Permission From Department)

13. If course is to replace an existing, course(s) will be deleted, and when should that deletion occur?

Course to be removed from inventory

Final Term to be offered (YYYY, i.e. use 20064 for Fall'06)

a. 

b. 

c. 

d. 

14. Catalog description (30 words Maximum)

Introduction to theory, methods and techniques used to gather and analyze remote sensor data. Topics range from low altitude air photo interpretation through satellite image acquisition.

15. Attach a copy of a complete outline of the major topics covered. (Providing a syllabus that includes this information is acceptable.)

Syllabus: Click here to view the Syllabus
Attachment 1 Click here to view the Attachment
Attachment 2 No Attachment

16. Where does this course fit in the University/College/Department curriculum? (Be specific by course level, if applicable). Indicate prospective demand.

This course will serve as an elective for the MS geology and MS Biology (Ecology) degrees. Remote sensing is becoming a commonplace tool in all of these fields. This course will provide the students with the theoretical basis and some practical applications of remote sensing to their chosen field.

17. If the proposed course is similar to another course in the College or University, please describe the difference and provide a rationale for the
This course overlaps in content with GEPL 4490/5490. Remote sensing is an interdisciplinary field that is used in the Geological, Ecological and Environmental science fields, as well as in Geography and Planning. After discussions between Dr. Czakowski in GEPL and Dr. Becker in DES, minor modifications were made such that the courses are perfectly compatible so that they can be cross listed and taught by either instructor. This provides a significant advantage, as it will combine two smaller classes into a single class, which will be offered every year. The course will provide an integrative opportunity for students in multiple programs, allowing both graduates and undergraduate students an interdisciplinary perspective on their coursework, while conserving faculty resources. The course will be individually taught, alternating years between faculty from GEPL and DES.

18. If the course is intended to meet a University Undergraduate Core requirement, complete the following and submit a course syllabus using the template:

Please explain how this course fulfills the general education guidelines. (Guidelines are available in Faculty Senate Website)

NA

Note on #12: Prerequisites should read: GEPL course OR EEES course OR permission of Instructor

Course Approval:

Department Curriculum Authority:

Department Chairperson:

College Curriculum Authority:

College Dean:

After college approval, submit the original signed form to the Faculty Senate (UH 3320) for undergraduate-level courses; for graduate-level courses submit the original signed form to the Graduate School (UH13240). For undergraduate/graduate dual-level courses, submit the proposals to each office.

Faculty Senate Undergrad. Curriculum Comm.:

Faculty Senate Core Curriculum Comm:

Graduate Council:

Office of the Provost :

Registrar's Office:
EEES 4490/5590 Course Proposal.

**Explanation as specified in Item #6**

The course will be offered at both the 4000 and 5000 level. Students taking the course at the 4000 level will have approximately 6-8 computer based practical exercises and 2 exams. Students taking the course at the 5000 level will be expected to complete all of the requirements of the 4000 level course, plus the completion of either a directed project or paper, with an in class presentation.
Tentative Syllabus

EEES 4490/5490 Remote Sensing of the Environment

Fall 2010

Instructor: Richard Becker

Office: BO 3026

Lab: BO 3018

Email: richard.becker@utoledo.edu

Office Hours TBD – 5 hours

Course Overview: This course will acquaint students with the fundamentals of the remote sensing process. Students will become acquainted with a variety of airborne and satellite sensor platforms which collect data in the visible, near infrared, thermal and microwave portions of the electromagnetic spectrum. By the end of the course the students should understand the fundamental methods behind the different sensing techniques, and know which techniques are best used to answer a wide variety of scientific questions.

Students will be able to demonstrate their understanding of the material through practical assignments and homework as well as exams.

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Announcements and additional reading materials will be made through Blackboard.

Please check Frequently

Grading:

4000 level:
Practical exercises (6-8): 60%
Exams (2): 40%

5000 level:
Practical exercises (6-8): 48%
Exams (2): 32%
Project and presentation: 20 % (15% project+5% presentation)
Topics covered:

Introduction to Remote Sensing
The remote sensing process
Electromagnetic Radiation Principles
Visible/near infrared radiation, Thermal infrared radiation, microwave radiation
Elements of Photographic Systems
History; film characteristics; camera systems, Air Photo Interpretation
Photogrammetry
Characteristics of vertical photos; determining scale; measuring distances and heights of objects. Stereoscopic viewing-equipment; image parallax; measurements using stereopair photographs.
Introduction to Electronic Sensors
Concept of spectral signatures; field radiometry; electronic scanning systems.
Introduction to Optical Satellite Systems
Landsat/SPOT; Meteorological; Ocean, NASA, ESA, Private
Microwave Remote Sensing
Sensing process; interpretation of data; sensing systems- applications
SAR, Passive systems, Interferometry (optional)
Thermal Infrared Remote Sensing
Thermal signal sources and sensors; calibration issues; interpretation of data; applications.
Remote Sensing of Vegetation
Spectral Vegetation Indices.
Aquatic Remote Sensing
Aquatic Optics
Remote Sensing identification of Lithology, Soils
Urban Remote Sensing
Land Use/Land Cover Classification
Digital Image Processing
Data Merging and scaling issues.

If you are not familiar with the University's standards for Academic Dishonesty (cheating, plagiarizing, etc.) and possible sanctions (ranging from verbal reprimand to expulsion), please review them in the university catalog at: http://www.utoledo.edu/catalog/2008catalog/general_2008.html

If you have a disability which may require a classroom accommodation, you need to register with the Office of Accessibility, Room 1400 Snyder Memorial (Voice 419.530.4981, TTY 419.530.2612), if you have not already done so. Information shared with the Office of Accessibility will be kept confidential to the extent consistent with State and Federal law.
**Tentative Schedule:**

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Readings</th>
<th>Assignment Due</th>
<th>Other</th>
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<tbody>
<tr>
<td>Aug 23</td>
<td>Introduction</td>
<td>Ch 1</td>
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<td>Aug 25</td>
<td>EM Principals</td>
<td>Ch 2</td>
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<td>Aug 30</td>
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<td>Sept 1</td>
<td>Photographic Systems</td>
<td>Ch 3+4</td>
<td>Exercise #1 – Introduction to Erdas</td>
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<td>Sept 6</td>
<td>No Classes</td>
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<td>Labor Day</td>
<td>Sept 7: Last day to Drop/Add</td>
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<td>Sept 8</td>
<td>Photogrammetry</td>
<td>Ch 5+6</td>
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<td>Sept 13</td>
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<td>Sept 15</td>
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<td>Preliminary project identification due (1 paragraph)</td>
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<td>Sept 20</td>
<td>Electronic Sensors</td>
<td>Ch 7</td>
<td>Exercise #2 – Air Photo Interpretation</td>
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<td>Sept 22</td>
<td>Optical Satellite Systems</td>
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<td>Thermal</td>
<td>Ch 8</td>
<td>Exercise #3 – Vis/IR</td>
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<td>Fall Break</td>
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<td>Oct 18</td>
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<td>Oct 27</td>
<td>Vegetation</td>
<td>Ch 11</td>
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<td>Project methods draft Due</td>
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<td>Aquatic</td>
<td>Ch 12</td>
<td>Exercise #5 – Radar interpretation</td>
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<td>Soils, Lithology identification</td>
<td>TBD Paper</td>
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<td>Exercise #6 – Aquatic Methodologies</td>
<td>Thanksgiving Break</td>
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<td>Land Use/Cover</td>
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<td>Thanksgiving Break</td>
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<td>Dec 6</td>
<td>Digital Processing issues</td>
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