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ORIGINAL

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Curriculum Proposal

Please type or select the requested information. Print completed forms, add appropriate paper attachments, and route through MSU's curricular process for recommendations and decisions.

(Check all that apply):

College: Social and Behavioral Sciences
☒ Undergraduate
Department: Geography
☒ Graduate
Program:
CIP # _____
Type of Change Proposed: COURSE PROPOSALS / New Course
Title Current:
Title Proposed: Advanced Remote Sensing
24-Char. Abbrev:

Proposal # 203
Effective Date of Change:
Academic Year 05-06
(For Office Use Only)

Course Designator and Number	Number of Credits
Geog 475/575	4

(if applicable)

Include a course or program description for the Bulletin (30-40 words maximum for courses, 100 for programs):

This course provides students the opportunity to develop further knowledge of remote sensing. Emphasis will be placed on introducing advanced theories and techniques for digital image processing and helping students obtain independent research skills using remote sensing data.

Rationale or Justification for change:

For General Education or Cultural Diversity Courses Only

General Education Course:

GE Category #	GE Category Name (Maximum of 3 Categories)
N/A	
N/A	
N/A	

? For Writing Intensive Courses, attach a description of the kind and quantity of writing.
? For Upper Division Courses, include a description of the respects in which it is broad and general rather than narrow and specific, and so suitable as GE.

Cultural Diversity Course:

(Please check one.)

☐ **Core** (At least 75% devoted to topics of race, gender, sexual orientation, age, class, and disabilities as they occur in United States Society.)

☐ **Related** (At least 25% devoted to the above topics or to a global perspective on topics related to African American, Asian, Hispanic, and Native American inhabitants of the United States.)

Attach paper copies of the following:
a. Syllabus or course outline.
b. Course's student learning outcomes associated with each GE competency or CD designation.
c. List of strategies to be used to assess students' achievement of each GE competency or CD designation.

For New Courses

(Check all that apply:)
☒ Course is an elective.
☐ Course is required for program
☒ Pre- or Co-requisites: 373 Intro GIS; 474/574 Intro Remote Sensing
☐ Other courses are being changed or eliminated. (Explain.)

Instructional Type: Lecture
Grading Format: ☒ Grade ☐ P/N

Course will be offered:
☐ Fall Semester
☒ Spring Semester
☐ Summer Session

☐ Course content or title is similar to courses in other departments. (Attach copy of letter of agreement with other program(s) contacted. Indicate the nature of the discussions and/or resolution of differences or potential conflicts.)

Attach paper copies of the following:
a. Syllabus or course outline.
b. Course's student learning outcomes.
c. A list of resources required to offer and support this course.
d. A description of how teaching this course will affect department staffing.
e. If 400/500 level course, an explanation of added expectations of graduate students.

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MINNESOTA STATE UNIVERSITY, MANKATO

Minnesota State University, Mankato

Curriculum Proposal

*****Signature Page*****

Department

X Recommended (Category/ies_____)
__ Not Recommended (Category/ies_____)

Department Chair — Date: 3/7/5

Comments:

College Curriculum Committee

X Recommended (Category/ies_____)
__ Not Recommended (Category/ies_____)

Committee Chair — Date: 4-4-05

Comments: Pending receipt of info on resources, staffing & additional expectations of grad students.

College Dean

X Recommended (Category/ies_____)
__ Not Recommended (Category/ies_____)

Dean — Date: 4/28/05

Comments:

General Education Subcommittee

__ Recommended (Category/ies_____)
__ Not Recommended (Category/ies_____)

General Education Subcommittee Chair — Date

Comments:

Undergraduate Curriculum and Academic Policy Committee

__ Recommended (Category/ies_____)
__ Not Recommended (Category/ies_____)

UCAP Faculty Chair — Date

Comments:

Faculty Association Graduate Committee

__ Recommended
__ Not Recommended

Faculty Association Graduate Chair — Date

Comments:

Graduate Dean

__ Recommended
__ Not Recommended

Graduate Dean — Date

Comments:

Academic Affairs Council

__ Recommended (Category/ies_____)
__ Not Recommended (Category/ies_____)

Assistant Vice President — Date

Comments:

Senior Vice President and Vice President for Academic Affairs

__ Approved (Category/ies_____)
__ Not Approved (Category/ies_____)

Sr. Vice President / Vice Pres. Academic Affairs — Date

Comments:

Geography 475 / 575: Advanced Remote Sensing

Course outline:

Please see the attached file (Advanced_RS_Syllabus_Fall06_FY.doc).

Course description for the catalog (30-40 words):

This course provides students the opportunity to develop further knowledge of remote sensing. Emphasis will be placed on introducing advanced theories and techniques for digital image processing and helping students obtain independent research skills using remote sensing data.

Learning outcomes and means of assessment:

Course Learning Outcomes	Means of Assessment
Develop thorough understanding of remote sensing for Earth and environmental systems analysis	Course readings, in-class discussions, critical reviews, exams Laboratory assignments
Develop advanced skills of digital image processing	
Able to think critically and synthesize knowledge	Course readings, in-class discussions, critical reviews
Able to conduct research, design project, and communicate findings	Course readings, laboratory assignments, critical reviews, project presentation and paper

replacement

C. List of Resources Required to Offer and Support This Course:

1. ONE GIS/REMOTE SENSING LAB – 25 seats in AH 11
2. ArcGIS and IMAGINE SOFTWARE

D. Description of How Teaching this Course Will Affect Department Staffing:

IN FALL 2004, THE DEPARTMENT HIRED A NEW REMOTE SENSING EXPERT IN A FULL-TIME TENURE-TRACK POSITION.

THIS NEW FACULTY MEMBER WILL TEACH THE TWO NEW REMOTE SENSING COURSES.

E. Explanation of added expectations of graduate students: **Included in Syllabus.**

Evaluation and Grading:

Component	Points
Midterm Exam I	80
Final Exam	100
Lab Assignments	80 (20 points x 4)
Critical Review	20
Final project:	
- Presentation	40
- Paper	40
Course participation & discussion	40
Undergraduate Total	**400**

Graduate Project Presentation 50

Total Graduate Points 450

Grades of exercises are based on academic merit of the student's answers to the questions. Students are expected to turn in their assignments on time. Late assignments are penalized 20% per day.

Class attendance and participation are required, and roll call will be taken. Additionally, students' involvements (question answering, critical thinking, problem discussion and presentation) in the class are encouraged and considered in the final grade.

A fixed grading scale (90%-A; 80%-B; 70%-C; 60%-D) will be used. However, in some cases, for example, the exam average is too high or too low; a flexible scale might be utilized to stretch the distribution of grades.

GRADUATE STUDENTS WILL BE REQUIRED TO DESIGN AND IMPLEMENT A REMOTE SENSING PROJECT SIMILAR TO METHODS USED IN A THESIS OR APP. AT THE END OF THE TERM, THEY WILL PRESENT THEIR WORK TO THE CLASS IN A SHORT PRESENTATION. STUDENTS WILL BE ENCOURAGED TO USE THIS PROJECT FOR THEIR ACTUAL THESIS OR APP.

Advanced Remote Sensing

GEOG 475/575, Fall 2006
Department of Geography
Minnesota State University – Mankato

Instructor: Fei Yuan, Department of Geography
Office & Office hour: TBA
Email & Phone: TBA
Teaching Assistant: TBA
Lecture & Lab: TBA
Place: TBA

Prerequisites:

GEOG 474/574: Introduction to Remote Sensing &
GEOG 373: Introduction to Geographic Information System

Credit: 4

Course Objectives and Description:

This course provides senior undergraduate or graduate students the opportunity to develop further knowledge of remote sensing. Emphasis will be placed on advanced theories and techniques of remote sensing for digital image processing and environmental analysis. Examples of remote sensing applications will be presented along with methods. After completing this course, students will be familiar with advanced digital image processing techniques and be able conduct research and communicate findings.

Required Textbook:

R. A. Schowengerdt, *Remote Sensing - Models and Methods for Image Processing,* Academic Press, 1997

Readings:

Additional reading will be assigned on topic issues

Remote Sensing Journals:

Remote Sensing of Environment
Photogrammetric Engineering and Remote Sensing
International Journal of Remote Sensing
Canadian Journal of Remote Sensing

Evaluation and Grading:

Component	Points
Midterm Exam I	80
Final Exam	100
Lab Assignments	80 (20 points x 4)
Critical Review	20
Final project:	
- Presentation	40
- Paper	40
Course participation & discussion	40
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Graduate Project Presentation	**50**
Total Graduate Points	**450**

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Course Policies:

Academic misconduct
Students are expected to do their own homework and exams. Students should refer to the Student Handbook for information on definitions of academic misconduct and relevant procedures.

Diversity and collegiality
Every class is influenced by the fact that students come from diverse ethnic and cultural backgrounds and hold different values. Across the course topics, the instructors encourage active and lively discussions.

Students with disability
Students with disability are encouraged to use university disability service for professional help.

Course Calendar: (Tentative)

Week	*Topic*	*Reading*
1	Course introduction; Overview of quantitative remote sensing, sensors, images, data systems	Ch. 1
2	Optical Radiation Models: visible to shortwave infrared region; midwave to thermal infrared region	Ch. 2
3	Sensor Models: resolution; spectral & spatial response; geometric distortion	Ch. 3
4	Data Models: univariate image statistics; multivariate image statistics; noise models; spatial statistics; topographic and sensor effects	Ch. 4
5	Spectral Transforms: feature space; multispectral ratios; principal components	Ch. 5
6	Spectral Transforms: Tasseled-cap components; contrast Enhancement	Ch. 5
7	Spatial Transforms: spatial filtering; Fourier transforms	Ch. 6
8	**Review & Midterm**	-
9	Correction and Calibration: noise reduction; radiometric calibration; distortion correction	Ch. 7
10	Image Fusion: orthorectification; multi-image fusion; spatial domain fusion	Ch. 8
11	Thematic Classification: feature extraction; training the classifier; nonparameteric classification; parametric classification;	Ch. 9
12	Thematic Classification: spatial-spectral segmentation; subpixel classification; hyperspectral image analysis	Ch. 9 & paper readings
13	Environmental change analysis	Paper readings
14	Remote sensing of environment: advanced applications	Paper readings
15	Research frontiers; Final Review	Paper readings
16	**Graduate project presentation**	-
Final exam (comprehensive)		