



**SOUTH DAKOTA BOARD OF REGENTS  
ACADEMIC AFFAIRS FORMS**

**New Course Request**

**SDSU** **Jerome J. Lohr College of Engineering / McComish**  
**Institution** **Department of Electrical Engineering and Computer Science**  
Dennis D. Hedge **Division/Department** **10/22/2024**  
**Institutional Approval Signature** **Date**

**Section 1. Course Title and Description**

Prefix & No.	Course Title	Credits
CSC 422-522	Computer Vision and Pattern Recognition	3

**Course Description**

This course introduces fundamentals and applications, and recent advances in computer vision and pattern recognition. Topics covered in this course include single-view and two-view geometry, multi-view 3D reconstruction and registration, 2D/3D features and descriptors, object detection and tracking, and semantic scene understanding using deep convolutional neural networks (CNN). Students will have hands-on experience in implementing computer vision algorithms and deep CNN architectures in solving real-world problems.

**Pre-requisites or Co-requisites**

Prefix & No.	Course Title	Pre-Req/Co-Req?
MATH 250	Introduction to Linear Algebra and Proof	Pre-Req

**Registration Restrictions**

None

**Section 2. Review of Course**

**2.1. Will this be a unique or common course?**

**Unique Course**

Prefix & No.	Course Title	Credits
EE 345	Digital Image Processing	3
CENG/CSC 414-514	Introduction to Computer Vision	3
GEOG 485-485L	Advanced Satellite Remote Sensing and Lab	2, 1

Provide explanation of differences between proposed course and existing system catalog courses below:

EE 345 Digital Image Processing covers the fundamentals of processing images that are stored digitally. The course covers the typical image processing necessary for converting raw satellite imagery to usable satellite images including geometric and atmospheric correction techniques. CENG/CSC 414-514 Introduction to Computer Vision is similar to EE 345 in that the course covers topics related to the signal processing of images. In addition to low-level computer vision topics covered in CENG/CSC 414-514, the proposed course also covers topics in pattern recognition techniques specifically applied to for visual information enabling tasks such as object detection, segmentation, and other high-level image understanding. Both EE 345 and CENG/CSC 414-514 have a signal processing course as a prerequisite. GEOG 485-485L Advanced Satellite Remote Sensing and Lab covers the basics of digitally processing remotely sensed imagery from different formats, characteristics and analysis techniques and how to integrate the imagery into GIS and GPS datasets. The imagery is

specific to remote sensing instruments. Computer Vision and Pattern Recognition emphasizes the science and mathematics required for programming computers to recognize features within images and not the processing of raw to finished product images. The course will be for all types of imagery and considers the automation of the processing of images from many sources including medical imaging technologies.

### **Section 3. Other Course Information**

#### **3.1. Are there instructional staffing impacts?**

No. Schedule Management, explain below: Faculty workload is available for this course. The department has offered this course as a CSC 492-592 Topics course in Spring 2024. The course will be offered during future spring semester.

**3.2. Existing program(s) in which course will be offered:** Computer Science (B.S.), Computer Science (M.S.), Healthcare Systems Engineering (B.S.)

**3.3. Proposed instructional method by university (as defined by AAC Guideline 5.4):** R - Lecture

**3.4. Proposed delivery method by university (as defined by AAC Guideline 5.5):** 001 - Face to Face

**3.5. Term change will be effective:** Fall 2025

**3.6. Can students repeat the course for additional credit?**  Yes, total credit limit:  No

**3.7. Will grade for this course be limited to S/U (pass/fail)?**  Yes  No

**3.8. Will section enrollment be capped?**  Yes, max per section:  No

**3.9. Will this course equate (i.e., be considered the same course for degree completion) with any other unique or common courses in the common course system database in Colleague and the Course Inventory Report?**  Yes  No

**3.10. Is this prefix approved for your university?**  Yes  No

### **Section 4. Department and Course Codes (Completed by University Academic Affairs)**

**4.1. University Department:** Electrical Engineering and Computer Science

**4.2. Banner Department Code:** SEEC

**4.3. Proposed CIP Code:** 11.0701

Is this a new CIP code for the university?  Yes  No

### **NEW COURSE REQUEST Supporting Justification for On-Campus Review**

Kwanghee Won	Kwanghee Won	Sept 18, 2024
<b>Request Originator</b>	<b>Signature</b>	<b>Date</b>
Sungyung Jung	Sungyung Jung	Sept 18, 2024
<b>Department Chair</b>	<b>Signature</b>	<b>Date</b>
Sanjeev Kumar	Sanjeev Kumar	Sept 18, 2024
<b>School/College Dean</b>	<b>Signature</b>	<b>Date</b>

1. Provide specific reasons for the proposal of this course and explain how the changes enhance the curriculum.

This course was previously offered as CSC 492-592 Topics during spring 2024 semester. Computer Vision and Pattern Recognition will be offered as an elective in the Computer Science and Healthcare Systems Engineering programs. This course will provide students with a background in the science and mathematics required for programming computers to recognize features within digital images. The emphasis will be on the interpretation of the images and not on the processing of raw data to create finished digital images. This course covers topics in a rapidly evolving field in both academia and industry, as evidenced by the growing number of enrollments in the course as a special topic in recent years. This course will appeal to both prospective and current students with current trends and demands, while also preparing them for a more competitive workforce with the skills required to succeed in this growing area.

2. Note whether this course is:  Required  Elective

3. In addition to the major/program in which this course is offered, what other majors/programs will be

affected by this course?

Minor in Computer Science, B.S. and Minor in Data Science

4. If this will be a dual listed course, indicate how the distinction between the two levels will be made.  
Graduate students will have different assessments compared to undergraduate students as well as more robust projects. Graduate students will be assigned additional tasks: research paper review and writing a professional technical report of their term project.
5. Desired section size    20
6. Provide qualifications of faculty who will teach this course. List name(s), rank(s), and degree(s).  
Chulwoo Pack, Assistant Professor, Ph.D.
7. Note whether adequate facilities are available and list any special equipment needed for the course.  
Facilities are adequate.
8. Note whether adequate library and media support are available for the course.  
Library resources and media support are adequate.
9. Will the new course duplicate courses currently being offered on this campus?  Yes       No
10. If this course may be offered for variable credit, explain how the amount of credit at each offering is to be determined.  
N/A