UMBC UGC Instructions for New Course Request Form (revised 12/2020)

Date submitted: The date that the form will be submitted to the UGC.

Course number & title: Enter the number and title of the course at the top of the page. Contact the Registrar's Office to confirm that the desired course number is available.

Cross-listed courses: All cross-listed course numbers must be listed in the course number box. Requests to create cross-listed courses must be accompanied by letters of support via email from all involved department chairs. Proposals for new courses or the addition of a cross-listing to an existing course must include as a part of the rationale the specific reason why cross-listing is appropriate. Email from all involved department chairs is also required when cross-listing is removed and when a cross-listed course is discontinued. Please note that Special Topics courses cannot be cross-listed.

Contact information: Provide the contact information of the Chair or UPD of the department or program housing the course. If the course is not housed in a department or program, then provide the same information for the head of the appropriate academic unit. (See UGC Procedures) If another faculty member should also be contacted for questions about the request and be notified about UGC actions on the request, include that person's contact information on the second line.

Course number: For cross-listed courses, provide all the numbers for the new course.

Transcript title: Limited to 30 characters, including spaces.

Recommended Course Preparation: ***Please note that all 300 and 400 level courses should have either recommended course preparation(s) or prerequisite(s) and that 100 or 200 level courses may have them.***
Here fill in what previous course(s) a student should have taken to succeed in the course. These recommendations will NOT be enforced by the registration system. Please explain your choices in the "rationale" (discussed below).

Prerequisite: ***Please note that all 300 and 400 level courses should have either recommended course preparation(s) or prerequisite(s)*** Here fill in course(s) students need to have taken before they enroll in this course. These prerequisites will be enforced through the registration system. Please explain your choices in the "rationale" (discussed below).

NOTE: Please use the words "AND" and "OR", along with parentheses as appropriate, in the lists of prerequisites and recommended preparation so that the requirements specified will be interpreted unambiguously.

NOTE: Unless otherwise indicated, a prerequisite is assumed to be passed with a "D" or better.

# of credits: To determine the appropriate number of credits to assign to a course please refer to the UMBC Credit Hour Policy which articulates the standards for assignment and application of credit hours to all courses and programs of study at UMBC regardless of degree level, teaching and learning formats, and mode of instruction.

Maximum total credits: This should be equal to the number of credits for courses that cannot be repeated for credit. For courses that may be repeated for credit, enter the maximum total number of credits a student can receive from this course. E.g., enter 6 credits for a 3 credit course that may be taken a second time for credit, but not for a third time. Please note that this does NOT refer to how many times a class may be retaken for a higher grade.

Grading method(s): Please review the grading methods document (this link can be found on the UGC forms page) before selecting a grading option. Please do not select all three grading options by default.

Proposed catalog description: Provide the exact wording of the course description as it will appear in the next undergraduate catalog. Course proposals should be a) no longer than 75 words, b) stated in declarative sentences in language accessible to students, and c) avoid reference to specific details that may not always pertain (e.g., dates, events, etc.). Course descriptions should not repeat information about prerequisites (which are always listed alongside the course description)."

Rationale: Please explain the following:
a) Why is there a need for this course at this time?
b) How often is the course likely to be taught?
c) How does this course fit into your department's curriculum?
d) What primary student population will the course serve?
e) Why is the course offered at the level (ie. 100, 200, 300, or 400 level) chosen?
f) Explain the appropriateness of the recommended course preparation(s) and prerequisite(s).
g) Explain the reasoning behind the P/F or regular grading method.
h) Provide a justification for the repeatability of the course.

Cross-listed courses: Requests to create cross-listed courses must be accompanied by letters of support via email from all involved department chairs. Proposals for new courses or the addition of a cross-listing to an existing course must include as a part of the rationale the specific reason why cross-

listing is appropriate. Email from all involved department chairs is also required when cross-listing is removed and when a cross-listed course is discontinued. Please note that Special Topics courses cannot be cross-listed.

Course Outline: Provide a syllabus with main topics and a weekly assignment schedule which includes complete citations for readings with page numbers as appropriate. Explain how students' knowledge and skills will be assessed.

Component: This is the type of instruction the course will utilize. The options are as follows: Clinical, Continuance, Discussion, Field Study, Independent Study, Laboratory, Lecture, Practicum, Seminar. Additionally, more than one component may be selected by the department. Please review the UMBC guidelines for components here: https://registrar.umbc.edu/course-component-and-credit-hour-guidelines/

Departmental Consent: Does this course require a student to have departmental approval noted in PeopleSoft prior to registering? If yes, please check the box. Departmental consent is a permanent addition to the course description. If the department would like consent to be administered by semester, or instructor do not check this box.

Note: the UGC form is a Microsoft Word form. You should be able to enter most of the information by tabbing through the fields. The document is protected. In the rare case that you need to unprotect the document, use the password 'ugcform'. Beware that you will lose all the data entered in the form's fields if you unlock and lock the document. https://highpoint-prd.ps.umbc.edu/app/catalog/listCatalog

UMBC UGC New Course Request: BTEC424 Machine Learning Applications for Translational Bioinformatics

Date Submitted: 2/3/2021

	Name	Email	Phone	Dept
Dept Chair or UPD	Dr. Annica Wayman	awayman@umbc.edu	301-738-6092	CNMS
Bioinformatics Track/Course Developer	Dr. Jeffrey Robinson	jrobin2@umbc.edu	301-335-4851	CNMS

COURSE INFORMATION:

Course Number(s) ~~Include Cross-listed Courses~~	BTEC424
Formal Title	Deep Learning Applications for Biomedical Image Analysis
Transcript Title (≤30c)	Deep Learning Bioimage Analysis
Recommended Course Preparation	NA
Prerequisite	Must the pre-requisite be passed with a grade of : ☐ 'A' ☐ 'B' ☒ 'C' or ☐ 'D' BTEC330 AND (BTEC350 OR STAT350) AND BTEC395 AND (BTEC362 (Python programming))
# of Credits Must adhere to the UMBC Credit Hour Policy	4
Repeatable for additional credit?	☐ Yes ☒ No
Max. Total Credits	4 This should be equal to the number of credits for courses that cannot be repeated for credit. For courses that may be repeated for credit, enter the maximum total number of credits a student can receive from this course. E.g., enter 6 credits for a 3 credit course that may be taken a second time for credit, but not for a third time. Please note that this does NOT refer to how many times a class may be retaken for a higher grade.
Grading Method(s)	☒ Reg (A-F) ☐ Audit ☐ Pass-Fail

PROPOSED CATALOG DESCRIPTION (Approximately 75 words in length. Please use full sentences.**):**

This course provides a knowledge and practical experience in analysis of biomedical images using Deep Learning/Neural Networks. Data includes immunofluorescence and confocal microscopy images, clinical radiology, and tumor immunohistopathology images. Deep learning algorithms covered include convolutional neural networks (CNNs), generative adversarial networks (GANs), and graph neural networks (GNNs). Common image analysis methods will be studied using ImageJ. Class projects and exercises will utilize standardized datasets such as MNIST and CIFAR-10, as well as radiology and histopathology images.

RATIONALE FOR NEW COURSE:

This course functions as one of the two capstone courses for the UMBC TLST Bioinformatics track (see the associated academic track proposal paperwork). Deep learning applications for image analysis is one of the biggest growth areas in biomedical informatics, for example developing predictive models for histopathology images, for example to diagnose tumor cells from a biopsy image. Many other applications for deep learning in image analysis are revolutionizing our society through such applications as self-driving vehicles, and students will be expected to be versed in the application of this technology to be competitive in the job market.

This course fits well within the TLST program, which provides an applied, hands-on curriculum to prepare students primarily for jobs in the biotechnology industry. This is a unique program and course for CNMS and supported by the Biological Sciences Department (see support letter).

ATTACH COURSE SYLLABUS (mandatory):

See the associated syllabus

Required Information for Registrar's Office Implementation:

Items below will be listed in the catalog, but do not require UGC approval. For future changes to these items, submit an RT ticket to the Registrar's Office.

Component	☐ Clinical ☐ Discussion ☐ Field Study ☐ Independent Study ☒ Laboratory ☒ Lecture ☐ Practicum ☐ Seminar ☐ Thesis Research ☐ Tutorial
Departmental Consent	☐ Yes ☒ No
When Offered (Fall, Summer, Winter, Spring, Other*) *If Other, please describe	Spring

Requested Effective Date (Please note that the final approval date will determine the earliest possible effective date):

Fall 2021