

New Course
CIS 3720 Cloud-based Business Application Development

Date of request: 12-OCT-2020

Request ID: B-2020-BIS-39

College: B

Department: BIS

Initiator name: Muhammad Razi

Initiator email: muhammad.razi@wmich.edu

Proposed effective term: 202140

Does course need General Education approval?: N

Will course be used in teacher education?: N

If 5000 level course, prerequisites apply to: U

Proposed course data:

New Course CIS 3720

New course selected: This new course is not seeking approval as a general education course.

1. Proposed course prefix and number:

CIS 3720

2. Proposed credit hours:

3

3. Proposed course title:

Cloud-based Business Application Development

4. Proposed course prerequisites:

CIS 2720

5. Proposed course corequisites:

none

6. Proposed course prerequisites that may be taken concurrently (before or at the same time):
none

7. Minimum grade for prerequisites (default grades are D for Undergrad and C for Grad):
D

8. Major and/or minor restrictions:
Not Applicable

9. List all the four-digit major and/or minor codes (from Banner) that are to be included or excluded:
none

10. Classification restrictions:
Not Applicable

11. List all the classifications (freshman, sophomore, junior, senior) that are to be included or excluded:
none

12. Level restriction:
Not Applicable

13. List the level (undergraduate, graduate) that is to be included or excluded.
Not Applicable

14. Do prerequisites and corequisites for 5000-level courses apply to undergraduates, graduates, or both?
Not Applicable

15. Is this a multi-topic course?
No

16. Proposed course title to be entered in Banner:
Cloud-based Business App Dev

17. Is this course repeatable for credit?
No

18. Is this course mandatory credit/no credit?
No

19. Select class type:
Lecture/Lab/Discussion

20. How many contact hours per week for this course?

A. Please choose Yes or No to indicate if this class is a Teacher Education class:

No

B. Please choose the applicable class level:

Undergraduate

C. Please respond Yes if this is a current general education course and/or a course being submitted for the new WMU Essential Studies program. Please respond No if it is neither.

No

D. Explain briefly and clearly the proposed improvement.

The purpose is to add a new course CIS 3720 – Cloud-based Business Application Development

E. Rationale. Give your reason(s) for the proposed improvement. (If your proposal includes prerequisites, justify those, too.).

CIS 3720 – Cloud-based Business Application Development is a new course which will be part of elective courses for the proposed redesigned CIS major. This new course will allow students to acquire advanced skills in the Cloud Computing Applications and possibly lead to their second certification on Amazon Web Services. This course is part of Cloud Solutions Practitioner Career Pathway promoted in the redesigned CIS major. The job market for graduates with Cloud Computing skills are increasing rapidly.

F. List the student learning outcomes for the proposed course or the revised or proposed major, minor, or concentration. These are the outcomes that the department will use for future assessments of the course or program.

LEARNING GOALS: After taking CIS 3720, students should be able to:

- Understand what cloud computing is and why it is important
- Discover many fundamental technologies that enable cloud computing, including software defined architectures, virtualization, and containers
- Discuss the applications and services provided by AWS, including AWS SDK
- Explore multiple “glue” technologies that enable cloud integration, such as web middleware, JSON, REST API, RPC, etc.
- Evaluate various approaches to representing data in API requests and responses, and errors notification to users
- Utilize secure mechanisms for users authentication and authorizing the use of specific portions of an API
- Understand the concepts of serverless computing and learn how to build and deploy the serverless applications
- Develop and deploy the cloud-based applications

G. Describe how this curriculum change is a response to student learning assessment outcomes that are

part of a departmental or college assessment plan or informal assessment activities.
This change is a response of the departmental informal assessment activities.

H. Effect on other colleges, departments or programs. If consultation with others is required, attach evidence of consultation and support. If objections have been raised, document the resolution. Demonstrate that the program you propose is not a duplication of an existing one.

There is no effect on other colleges, departments, or programs. No other programs in the university offer any course completely on the Cloud Computing. Computer Science department's course "CS 5541 - Computer Systems" covers a very small topic on Cloud Computing.

I. Effect on your department's programs. Show how the proposed change fits with other departmental offerings.

Redesign of CIS major has been proposed. CIS 3720 – Cloud-based Business Application Development is added as an elective course in the proposed redesigned CIS major. This new course will allow students to acquire advanced skills in the Cloud Computing Applications and possibly lead to their second certification on Amazon Web Services. This course is part of Cloud Solutions Practitioner Career Pathway promoted in the redesigned CIS major.

J. Effects on enrolled students: are program conflicts avoided? Will your proposal make it easier or harder for students to meet graduation requirements? Can students complete the program in a reasonable time? Show that you have considered scheduling needs and demands on students' time. If a required course will be offered during summer only, provide a rationale.

The proposed changes will not have any effect on enrolled students. Students in the current CIS program will continue their program without interruption. The proposed changes, if approved, will be effective Fall 2021. Courses required by the current CIS curriculum will be offered uninterrupted.

K. Student or external market demand. What is your anticipated student audience? What evidence of student or market demand or need exists? What is the estimated enrollment? What other factors make your proposal beneficial to students?

Since there are plenty of jobs available in the Amazon Web Services (AWS) and Microsoft Azure Cloud Computing platforms, it is expected that the proposed new course on Cloud Computing will make the CIS major more attractive and reverse the declining enrollment in the program. In addition, CIS Major will have a first mover advantage in the Cloud Computing area in Michigan.

L. Effects on resources. Explain how your proposal would affect department and University resources, including faculty, equipment, space, technology, and library holdings. Tell how you will staff additions to the program. If more advising will be needed, how will you provide for it? How often will course(s) be offered? What will be the initial one-time costs and the ongoing base-funding costs for the proposed program? (Attach additional pages, as necessary.) The proposed changes will not have any immediate effect on the department and University resources. Since CIS 3720 is an elective course for CIS majors, significant demand for this course is not expected before Fall 2022. In addition, due to the reduced number of CIS major, some courses are offered one section instead of two. Therefore, department will have no problem offering CIS 3720.

M. With the change from General Education to WMU Essential Studies, this question is no longer used.

For courses requesting approval as a WMU Essential Studies course, a syllabus identifying the student learning outcomes and an action plan for assessing the student learning outcomes must be attached in the Banner Workflow system.

Not Applicable

N. (Undergraduate proposals only) Describe, in detail, how this curriculum change affects transfer articulation for Michigan community colleges. For course changes, include detail on necessary changes to transfer articulation from Michigan community college courses. For new majors or minors, describe transfer guidelines to be developed with Michigan community colleges. For revisions to majors or minors, describe necessary revisions to Michigan community college guidelines. Department chairs should seek assistance from college advising directors or from the admissions office in completing this section.

The proposed change will have no effect on the current transfer articulation for Michigan community colleges. This is a new course.

O. Current catalog copy:

None

P. Proposed catalog copy:

The cloud has become a key enabler for development and delivery of IT services due to advantages such as high availability, unlimited storage capacity, on-demand scalability and resilience. This course begins with fundamentals of cloud computing. Gradually, students are introduced to computing power, security, storage, networking, messaging, and Amazon Web Services (AWS) platform. The topics also include the fundamental concepts of designing and deploying scalable, extendable, and maintainable cloud-based applications using modern cloud architecture. This course also explores serverless technologies that improve the speed of application development and discusses the cost of running a cloud infrastructure. Experiential learning includes integration of components from AWS platform to prepare students for associate-level AWS developer certification.

CIS3720: Cloud-based Business Application Development

Master Syllabus

Course Description

The cloud has become a key enabler for development and delivery of IT services due to advantages such as high availability, unlimited storage capacity, on-demand scalability and resilience. This course begins with fundamentals of cloud computing. Gradually, students are introduced to computing power, security, storage, networking, messaging, and Amazon Web Services (AWS) platform. The topics also include the fundamental concepts of designing and deploying scalable, extendable, and maintainable cloud-based applications using modern cloud architecture. This course also explores serverless technologies that improve the speed of application development and discusses the cost of running a cloud infrastructure. Experiential learning includes integration of components from AWS platform to prepare students for associate-level AWS developer certification.

Prerequisites & Co-requisites: **Prerequisite:** CIS2600 or CIS2650; Minimum Grade of C

Learning Outcomes

- Understand what cloud computing is and why it is important
- Discover many fundamental technologies that enable cloud computing, including software defined architectures, virtualization, and containers
- Discuss the applications and services provided by AWS, including AWS SDK
- Explore multiple “glue” technologies that enable cloud integration, such as web middleware, JSON, REST API, RPC, etc.
- Evaluate various approaches to representing data in API requests and responses, and errors notification to users
- Utilize secure mechanisms for users authentication and authorizing the use of specific portions of an API
- Understand the concepts of serverless computing and learn how to build and deploy the serverless applications
- Develop and deploy the cloud-based applications

Topic Coverage (14 Week Course)

Week	Main Topic	Topic Detail including Sub-Topics
1	Cloud Overview	The basics of cloud computing, including cloud deployment models, and benefits. Explore services provided by Amazon Web Services (AWS)
2	Cloud Compute Services	The needs for servers, compute power, and security. Explore AWS compute services including Elastic Cloud Compute (EC2), Virtual Private Cloud (VPC), and Lambda for serverless framework and Elastic Beanstalk in action.
3		
4	Cloud Storage and Content Delivery	The need for storage and content delivery in the cloud. Explore storage services such as S3, DynamoDB, RDS, and CloudFront. Utilize DynamoDB table, launch MySQL database instance, and create CloudFront distribution.
5		
6	Networking and Security	Learn the basics of networking and resilience in the cloud. Explore services like Route 53, EC2 Auto Scaling, and Elastic Load Balancing
7		
8	Developing Cloud Application Basics	Explore key terminology and building blocks of cloud system. Understand design paradigm of modern cloud applications, including AWS SDK. Explore various “glue” technologies that enable the integration of cloud computing

9	Consume and Deploy Cloud Services	Using cloud-based relational database for storing user data. Implement filestore to store media like image using AWS S3. Consume cloud storage services within the application. Deploy the application to the AWS platform using AWS SDK
10		
11	User Authentication and Security	Understand the cloud-based authentication mechanisms. Implement authentication mechanisms in the application.
12	Serverless Computing	Understand the main components of a serverless application. Develop simple application using the concept of Function as a Service (FaaS). Build a simple REST API using serverless technologies including API Gateway, AWS Lambda, and AWS DynamoDB.
13		
14	Application Scalability and Elasticity	Explore tools and process to reduce growing pains.