

MEMORANDUM TO: Ogden College of Science and Engineering Curriculum Committee

Dr. Melanie Autin
 Dr. Nahid Gani
 Dr. Scott Grubbs
 Dr. Ting-Hui Lee
 Dr. Andy Mienaltowski

Dr. Les Pesterfield
 Dr. Todd Willian
 Mr. Jason Wilson
 Dr. Bangbo Yan

FROM: Dr. Stuart Burris, Chair

SUBJECT: Agenda for Thursday, November 2, 2023

A. OLD BUSINESS:

I. Consideration of the minutes of the October 5, 2023 meeting.

B. NEW BUSINESS:

Type of item	Description of Item & Contact Information
Informational Proposals not attached.	<p><u>The following items were sent through the expedited process:</u></p> <p>Add or Revise Course Student Learning Outcomes & Content Outlines AGMC 170, 171, 270, 271, 272, 273, 326, 371, 372, 373, 374, 377, 378, 392, 393, 425, 475 AGSY 176 CE 161, 176, 300, 305, 310, 316, 322, 342, 352, 370, 371, 378, 379, 380, 381, 382, 383, 384, 410, 411, 412, 426, 440, 444, 461, 474, 475 CHEM 107, 108, 222, 223, 299, 304, 320, 330, 340, 341, 342, 343, 369, 389, 399, 420, 421, 430, 435, 436, 440, 446, 447, 450, 451, 452, 453, 462, 467, 470, 475, 476, 490, 491 CS 301, 360, 369, 372 MATH 109, 112, 115, 115E, 116, 116E, 117, 123, 137 206, 237, 275, 307, 308, 310, 317, 323, 331, 337, 370, 398, 409, 413, 421, 450, 475, 490, 498 MFGE 120 SEAS 101, 175, 367, 368, 398</p> <p>Suspend/Delete CS 257, 370 MATH 497 ME 300, 333, 400, 412 SEAS 176</p> <p>Change an Internal Pre-req ENGR 400 MATH 304, 490</p> <p>Title Clarification MATH 403, 411, 413</p> <p>Temporary Course BDAS 320: Art, Business, and Science of Distilling, Brewing, and Winemaking</p>
Action	Proposal to Create a New Course

	DATA 399: Career Readiness in Data Science Contact: Alex Lebedinsky, alex.lebedinsky@wku.edu , x3150
Action	Proposal to Create a New Course DATA 499: Senior Assessment – Data Science Contact: Alex Lebedinsky, alex.lebedinsky@wku.edu , x3150
Action	Proposal to Create a New Program Data Science, Bachelor of Science Contact: Alex Lebedinsky, alex.lebedinsky@wku.edu , x3150
Action	Proposal to Create a New Course MATH 112E: Problem Solving and Mathematical Skills for Teachers Contact: Patrick Brown, Patrick.brown@wku.edu , x6247
Action	Proposal to Create a New Course MATH 123E: Mathematical Applications for Business Contact: Leslie Plumlee, Leslie.plumlee@wku.edu , 2703036147 Contact: Robin Ayers, robin.ayers@wku.edu , x5009
Action	Proposal to Make a Course Change MATH 382: Probability and Statistics I Contact: Melanie Autin, melanie.autin@wku.edu , x6171
Action	Proposal to Make a Course Change MATH 482: Probability and Statistics II Contact: Melanie Autin, melanie.autin@wku.edu , x6171
Action	Proposal to Make a Program Change Ref. 528P/528: Mathematics, Bachelor of Arts Contact: Patrick Brown, Patrick.brown@wku.edu , x6247
Action	Proposal to Make a Program Change Ref. 728P/728: Mathematics, Bachelor of Arts Contact: Patrick Brown, Patrick.brown@wku.edu , x6247
Action	Proposal to Make a Program Change Ref. 730P/730: Middle Grades Mathematics, Bachelor of Science Contact: Patrick Brown, Patrick.brown@wku.edu , x6247
Action	Proposal to Make a Program Change Ref. 731: Mathematical Economics, Bachelor of Science Contact: David Zimmer, David.zimmer@wku.edu , x2880 Contact: Melanie Autin, melanie.autin@wku.edu , x6171
Action	Proposal to Create a New Course PHYS 170: Introduction to the Physics Major Contact: Michael Carini, Michael.carini@wku.edu , x6198
Action	Proposal to Create a New Course PHYS 171: Exploring the Physics Major Contact: Michael Carini, Michael.carini@wku.edu , x6198

Action	Proposal to Make a Course Change PHYS 312: Laboratory Practice and Procedure Contact: Ting-Hui Lee, ting-hui.lee@wku.edu , x6472
Action	Proposal to Make a Course Change ME 492: ME Internship Project Contact: Kevin Schmaltz, kevin.schmaltz@wku.edu , x8859

C. OTHER BUSINESS

Members Present:

Dr. Melanie Autin
Dr. Nahid Gani
Dr. Scott Grubbs
Dr. Michael Carini for Dr. Ting-Hui Lee
Dr. Andy Mienaltowski
Dr. Les Pesterfield
Dr. Todd Willian
Dr. Bangbo Yan

FROM: Dr. Stuart Burris, Chair

The meeting was called to order at 4:00pm.

OLD BUSINESS:

Minutes from the September 2023 meeting were approved as posted.

NEW BUSINESS:

Action Agenda:

PSYS 482: Wilson, Grubbs; approved
Ref. 747E/747: Autin/Willian; approved

Other Business:

Adjourned at 4:19pm

Course Change Request

New Course Proposal

Date Submitted: 09/29/23 3:36 pm

Viewing: **DATA 399 : Career Readiness in Data Science**

Last revision: 09/29/23 3:36 pm

Changes proposed by: alx50504

Programs referencing this course
: [Data Science](#)

Proposed Action

Active

In Workflow

1. **ECON Approval**
2. **BU Dean**
3. **BU Curriculum Committee**
4. **SC Dean**
5. **SC Curriculum Committee**
6. Undergraduate Curriculum Committee
7. University Senate
8. Provost
9. Course Inventory

Approval Path

1. 10/03/23 9:40 am
David Zimmer (david.zimmer):
Approved for ECON Approval
2. 10/04/23 9:09 am
Evelyn Thrasher (evelyn.thrasher):
Approved for BU Dean
3. 10/25/23 2:11 pm
Alexander Lebedinsky (alex.lebedinsky):
Approved for BU Curriculum Committee
4. 10/30/23 9:09 am
Stuart Burris (stuart.burris):
Approved for SC Dean

Contact(s)

Name	E-mail	Phone
Alex Lebedinsky	alex.lebedinsky	5-3150

Term for implementation Fall 2024

Academic Level Undergraduate

Course prefix (subject area) DATA - Data Course number 399

Department Economics

College Business

Course title
Career Readiness in Data Science

Abbreviated course title CAREER READINESS DATA SCIENCE

Course description

Introduction to preparation for a career in Data Science, including exposure to careers in Data Science; development of professional resumes and cover letters; oral communications; interviewing skills; ethical standards; and professional networking. This course is limited to juniors and seniors in the Data Science major.

Credit hours 1

Repeatable

Yes

Number of repeats 2

For maximum credits 1

Default grade type Standard Letter Alternate grade type(s)

Is this course intended to span more than one term?

No

Schedule type

Lecture

CIP Code 307001 - Data Science, General.

Does this course have prerequisites

No

Corequisites

Equivalent Courses

Restrictions:

College restriction? No

Field of study restriction/major? No

Classification restriction? Yes

Select:

Include

Classification:

Classification restriction
Junior
Senior

Departmental
Restrictions

The course is restricted to Data Science Majors.

Reason for
developing the
proposed course

This course will be included in the Data Science major, a joint program between GFCB and OCSE. The junior-level course is intended for students to gain exposure to the unique opportunities, and needs of data science careers, and to prepare them for the job market in this field.

GFCB developed similar courses for all its majors.

Is this related to
other courses at
WKU?

Yes

Related courses

ECON 399 - Career Readiness in Economics

MGT 399 - Career Readiness in Management

BDAN 399 - Career Readiness in Business Data Analytics

MKT 399 - Career Readiness in Marketing

FIN 399 - Career Readiness in Finance

ACCT 399 - Career Readiness in Accounting

What departments/programs have been consulted concerning potential impact (e.g. to possible duplication or conflict, changed corequisite or prerequisite for equivalent courses, etc.)? Please provide names and dates for individuals consulted.

No other departments were consulted. The related courses are restricted to the students in those majors, and the proposed course will be restricted to the students in this major, hence there is no impact on other courses.

How many sections of this course per academic year will be offered?

one section every semester

How many students per section are expected to enroll in this proposed course?

10-15

How many students per academic year are expected to enroll?

20-30

How were these projections calculated? Explain any supporting evidence/data you have for arriving at these projections:

These projections are based on the forecasted number of students in the proposed Data Science program. The details of that forecast can be found in that proposal.

How are these related?

No relation

Is this course part of a program that leads to teacher certificate?

No

Are you seeking Colonnade approval for this course?

No

Student Learning
Outcomes

#	Student Learning Outcomes
1	Produce professional job application materials for a career in Data science.
2	Apply best practices in a Data Science job interview
3	Populate a LinkedIn profile or another professional networking platform with information appropriate for data science professional.

Content outline

#	Topic
1	How to match personal and professional skills with the right job.
2	Career opportunities in Data Science.
3	Preparing for the Data Science job market.
4	Best practices for new Data Science professionals.
5	Career development resources.

Student
expectations and
requirements

Tentative texts and
course materials
No textbook required.

Special equipment,
materials, or library
resources needed
None

Additional
information

Supporting
documentation

Reviewer Comments

Course Change Request

New Course Proposal

Date Submitted: 09/29/23 3:37 pm

Viewing: **DATA 499 : Senior Assessment - Data Science**

Last revision: 10/20/23 10:38 am

Changes proposed by: alx50504

Programs
referencing this
course
: [Data Science](#)

Proposed Action

Active

In Workflow

1. **ECON Approval**
2. **BU Dean**
3. **BU Curriculum Committee**
4. **SC Dean**
5. **SC Curriculum Committee**
6. Undergraduate Curriculum Committee
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Approval Path

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Alexander Lebedinsky (alex.lebedinsky):
Approved for BU Curriculum Committee
4. 10/30/23 9:09 am
Stuart Burris (stuart.burris):
Approved for SC Dean

Contact(s)

Name	E-mail	Phone
Alex Lebedinsky	alex.lebedinsky@wku.edu	270-745-3150

Term for implementation Fall 2024

Academic Level Undergraduate

Course prefix (subject area) DATA - Data Course number 499

Department Economics

College Business

Course title
Senior Assessment - Data Science

Abbreviated course title SENIOR ASSESSMENT DATA SCIENCE

Course description

A capstone course that provides an opportunity to apply technical skills acquired in the major to solving real-world problems. Students will complete a research project to showcase the knowledge and expertise they acquired in the program.

Credit hours 3

Repeatable

Yes

Number of repeats 2

For maximum credits 3

Default grade type Standard Letter Alternate grade type(s)

Is this course intended to span more than one term?

No

Schedule type

Applied Learning

Lecture

CIP Code 307001 - Data Science, General.

Does this course have prerequisites

Yes

Prerequisites

And/Or	(	Course/Test Code	Min Grade/Score	Academic Level	)	Concurrency?
		BDAN 420	C	UG		No
And		ECON 465	C	UG		No

Corequisites

Equivalent Courses

Restrictions:

College restriction? No

Field of study restriction/major? No

Classification restriction? Yes

Select:

Include

Classification:

Classification restriction
Senior

Departmental Restrictions

Restricted to Data Science majors.

Reason for developing the proposed course

This course is a capstone for the Data Science major.

Is this related to other courses at WKU?

No

What departments/programs have been consulted concerning potential impact (e.g. to possible duplication or conflict, changed corequisite or prerequisite for equivalent courses, etc.)? Please provide names and dates for individuals consulted.

N/A

How many sections of this course per

academic year will
be offered?
one every semester

How many students
per section are
expected to enroll in
this proposed
course?
10-15

How many students
per academic year
are expected to
enroll?
20-30

How were these
projections
calculated? Explain
any supporting
evidence/data you
have for arriving at
these projections:

These projections are based on the forecast for the number of students in the Data Science major.
The details can be found in the program proposal for the major.

Is this course part of a program that leads to teacher certificate? No

Are you seeking Colonnade approval for this course? No

Student Learning Outcomes

#	Student Learning Outcomes
1	Apply Data Science training and knowledge to a capstone project

Content outline

#	Topic
1	Capstone project

Student expectations and

requirements

Students will complete a research project a research project.

Tentative texts and
course materials

None

Special equipment,
materials, or library
resources needed

None

Additional
information

Supporting
documentation

Reviewer Comments

Key: 9741

Program Change Request

New Program Proposal

Date Submitted: 09/29/23 3:33 pm

Viewing: : **Data Science**

Last edit: 10/18/23 2:01 pm

Changes proposed by: alx50504

Proposed Action	Active		
Contact Person	Name	Email	Phone
	Alex Lebedinsky	alex.lebedinsky@wku.edu	270-745-3150
Term of Implementation	2024-2025		
Academic Level	Undergraduate		
Program Type	Major		
Degree Types	Bachelor of Science		
Department	GFCB Interdisciplinary Programs		
College	Business		
Was your Notification of Intent (submitted to CPE by the Provost's Office) approved?	Yes		
Program Name (eg. Biology)	Data Science		
Will this program have concentrations?	No		
CIP Code	30.7001 - Data Science, General.		
Will this program lead to teacher certification?	No		
Does the proposed program contain 25% or more new content not previously taught in another course at WKU? If yes, contact the Office of the Provost for additional SACSCOC proposal requirements	No		

In Workflow

1. 99BU Approval
2. BU Dean
3. BU Curriculum Committee
4. SC Dean
5. SC Curriculum Committee
6. Undergraduate Curriculum Committee
7. University Senate
8. Provost
9. Board of Regents
10. Program Inventory

Approval Path

1. 10/01/23 4:27 pm Evelyn Thrasher (evelyn.thrasher): Approved for 99BU Approval
2. 10/01/23 4:28 pm Evelyn Thrasher (evelyn.thrasher): Approved for BU Dean
3. 10/25/23 2:11 pm Alexander Lebedinsky (alex.lebedinsky): Approved for BU Curriculum Committee
4. 10/30/23 9:09 am Stuart Burris (stuart.burris): Approved for SC Dean

Catalog Content

Program Overview (Catalog field: Overview tab)

The Bachelor of Science in Data Science program equips students with a comprehensive understanding of the interdisciplinary field of data science. This program merges computer science, statistics, and domain-specific knowledge to harness the power of data for informed decision-making and innovative problem-solving. Through a combination of theoretical coursework, hands-on projects, and real-world applications, students will graduate with the skills necessary to excel in the rapidly evolving landscape of data-driven industries.

To earn the degree, the students have to complete a core set of classes and at least one certificate or a minor. The students will have an opportunity to personalize the degree by choosing one or multiple certificates that align with their interests.

Program Highlights:

Interdisciplinary Approach: Our program seamlessly integrates concepts from business data analytics, economics, computer science, mathematics, and domain-specific areas, providing students with a holistic perspective on data science.

Strong Foundation: Students will develop a solid foundation in programming, database management, statistical analysis, and machine learning techniques.

Data Visualization: Learn to create compelling visualizations that effectively communicate complex insights to both technical and non-technical audiences.

Industry-Standard Tools: Gain proficiency in popular tools and technologies used in the field, such as Python, R, SQL, and data manipulation libraries.

Capstone Project: Culminate your learning journey with a capstone project where you will tackle a real-world problem using data-driven approaches under the guidance of faculty mentors.

Career Preparation: Receive guidance on resume building, interview techniques, and job search strategies, and access our strong network of alumni working in various data science roles.

Career Opportunities: Graduates of the program will be well-prepared for a wide range of careers in the data science field, including but not limited to:

Data Analyst

Machine Learning Analyst

Business Intelligence Analyst

Quantitative Analyst

Predictive Modeler

Market Research Analyst

Data Scientist

Curriculum Requirements (Catalog field: Program Requirements)

Core Courses		42
BDAN 250	Introduction to Analytics	3
BDAN 310	Business Data Analytics	3
BDAN 350	Data Management	3
BDAN 420	Predictive Modeling	3
CS 180	Computer Science I	4
DATA 301	Big Data with its Applications	3
ECON 206	Statistics	3
ECON 465	Regression and Econometric Analysis	3
ECON 487	Data Methods in Economics	3
MATH 136	Calculus I	4
MATH 306	Applied and Computational Linear Algebra	3
STAT 330	Introduction to Statistical Software	3
DATA 399	Course DATA 399 Not Found (Career Readiness)	1
DATA 499	Course DATA 499 Not Found (Senior Seminar)	3
Select a block of electives from one of the options below		
Courses leading to the Applied Analytics Certificate		9
BDAN 305	Principles of MIS with Spreadsheets	3
Select two courses		6
BDAN 330	Structured Data Analysis	
BDAN 410	DSS Analysis and Design	
BDAN 430	Data Visualization	
Courses Leading to the Applied Statistics Minor		9
STAT 402	Experimental Design	3
MATH 382	Probability and Statistics I	3
MATH 482	Probability and Statistics II	3
Courses Leading to the Computer Science Minor		16
CS 290	Computer Science II	4
CS 351	Database Management Systems I	3

Three 300- or 400-level CS course not already in the program					9
Courses Leading to the Economic Data Analytics Certificate					9
ECON 307	Financial Data Modeling				3
ECON 480	Economic Forecasting				3
ECON 486	Applied Statistical Methods in Economics				3
Courses Leading to the GIS Certificate					14
GIS 316	Geographic Information Systems I				4
GIS 317	Geographic Information Systems II				4
GIS 417	GIS Analysis & Modeling				3
GIS 419	GIS Programming				3
Courses leading to the Health Informatics Certificate					18-19
BDAN 305	Principles of MIS with Spreadsheets				3
BDAN 330	Structured Data Analysis				3
HIM 230	Computer Systems and Applications in Health Information Management				3
HIM 330	Electronic Health Record Systems				3
HIM 430	Health Data Management and Analytics				3
Choose one of the following					3-4
HIM 100	Health Data Content and Structure				
HCA 340	Health Care Organization and Management				
Courses Leading to the Emergency Management Disaster Science MDS Certificate					
EMDS 400	Emergency Management Policy and Practices				3
EMDS 401	Natural and Technological Disaster Risks				3
EMDS 402	Resiliency in Response to Terrorism and Violence				3
EMDS 403	Advanced Disaster Planning, Management, and Preparedness				3
EMDS 404	Trends in Disaster Preparedness and Management				3
4-Year Plan					
First Year					
Fall	Hours	Spring		Hours	
BDAN 250	3	CS 180		4	
COMM 145	3	ECON 206		3	
ENG 100	3	ENG 200 (or another approved Colonnade Course)		3	
MATH 136	4	HIST 101 or HIST 102		3	
Colonnade Explorations - Arts And Humanities	3	Colonnade Explorations - Social and Behavioral		3	
	16			16	
Second Year					
Fall	Hours	Spring		Hours	
BDAN 310	3	BDAN 350		3	
DATA 301	3	MATH 306		3	
STAT 330	3	Colonnade Explorations - Natural and Physical Sciences		3	
Colonnade Explorations - Natural and Physical Sciences	3	Data Science Elective		3	
Elective/Second Major/Minor/Certificate course	3	Elective/Second Major/Minor/Certificate course		3	
	15			15	
Third Year					
Fall	Hours	Spring		Hours	
ENG 300	3	DATA 399		1	
ECON 465	3	ECON 487		3	
Data Science Elective	3	Data Science Elective		3	
Elective/Second Major/Minor/Certificate course	3	Elective/Second Major/Minor/Certificate course		3	
Elective/Second Major/Minor/Certificate course	3	Elective/Second Major/Minor/Certificate course		3	
	15	Colonnade Connections		3	
				16	
Fourth Year					
Fall	Hours	Spring		Hours	
BDAN 420	3	DATA 499		3	
Elective/Second Major/Minor/Certificate course	3	Colonnade Connections		3	
Elective/Second Major/Minor/Certificate course	3	Elective/Second Major/Minor/Certificate course		3	
Colonnade Connections	3	Elective/Second Major/Minor/Certificate course		3	
Elective/Second Major/Minor/Certificate course	3				

First Year

Fall	Hours	Spring	Hours
	15		12

Total Hours 120

Will this program be managed or owned by more than one department?

Yes

Interdisciplinary
Departments

Secondary Departments
Coll BU:Interdiscpl/Undeclared (99BU)
Coll SC:Interdiscpl/Undeclared (99SC)

Does this program include courses from outside your department?

Yes

Outside Courses
Details

Who approved including these courses?	When were they approved?
Jan Hun-Shepherd, William Mkanta - courses for the Health Informatics Certificate, Leslie North - GIS and EMDS	09/26/2023, 10/17/2023

Relation to Mission and Strategic Plan

Explain how the proposed program relates to the institutional mission and academic strategic plan.

WKU's Strategic plan aims to "Facilitate high impact practices, immersive learning in different cultures, process-learning practices, and collaborative learning and instructional opportunities." The interdisciplinary nature of the program is collaborative by design, and will award students with multiple opportunities for immersive learning through project work and applied learning.

Explain how the proposed program addresses the state's postsecondary education strategic agenda

The Data Science major aligns with the KY Postsecondary Education Strategic Agenda for 2022-30, focusing on Talent and Value. This new major aims to enhance the talent development of Kentucky students by capitalizing on the expertise of our current faculty. Introducing this major at WKU is expected to broaden career prospects for more WKU graduates, as number of jobs is projected to grow by 35% over the next decade, according to the Bureau of Labor Statistics. The program will offer tremendous value for our students – as of 2022, the median salary for Data Scientists is \$103,500 per year. With the increasing availability of broadband internet in Kentucky, and with greatly expanded acceptance of remote work, especially in the field of data science, this degree will offer Kentucky residents opportunities to hold high-paying jobs without having to leave the state. All Data Science majors will be expected to engage in applied interdisciplinary research, which will enhance their employability. Leveraging the skills of our existing faculty will allow WKU to offer this program in a very cost-effective manner and will lay the foundation for future growth.

Program Quality and Demand

Provide justification and evidence to support the need and demand for this proposed program.

Include any data on student demand; career opportunities at the regional, state, and national level; and any changes or trends in the discipline that necessitate a new program.

Please insert one Learning Outcome per box. Click green plus sign for additional LO boxes

Learning Outcomes
and Measurement
Plan

	List all student learning outcomes of the program.	Measurement Plan
SLO 1	Data Manipulation and Analysis: Students will be able to effectively gather, clean, transform, and analyze diverse datasets. They will showcase the ability to employ programming languages and tools to manipulate data, extract meaningful insights, and identify trends and patterns.	DATA 499 - Senior Assessment capstone course will require students to conduct a research project where this SLO will be assessed.
SLO 2	Statistical Modeling Competence: Students will acquire a comprehensive understanding of statistical techniques. They will demonstrate the capacity to apply appropriate models, evaluate their performance, and make informed decisions about model selection and interpretation of results.	DATA 499 - Senior Assessment capstone course will require students to conduct a research project where this SLO will be assessed.

	List all student learning outcomes of the program.	Measurement Plan
SLO 3	Data Visualization and Communication: Students will be adept at creating compelling visualizations that succinctly represent complex data-driven insights. They will effectively communicate their findings to technical and non-technical audiences, demonstrating the skill to convey the implications of their analysis.	DATA 499 - Senior Assessment capstone course will require students to conduct a research project where this SLO will be assessed.
SLO 4	Ethical and Responsible Data Practices: Students will comprehend the ethical considerations associated with data collection, storage, and usage. They will demonstrate an awareness of privacy concerns, bias mitigation, and the legal and ethical implications of their data science work.	DATA 399 - Career Readiness and DATA 301 - Big Data will cover the topics on ethical and responsible data practices. This SLO will be assessed in those two classes.
SLO 5	Interdisciplinary Problem Solving: Graduates will have the ability to apply data science techniques to tackle real-world problems using data-driven approaches. They will showcase their capacity to integrate computer science, statistics, and domain-specific knowledge to provide innovative solutions in diverse fields.	DATA 499 - Senior Assessment capstone course will require students to conduct a research project where this SLO will be assessed. Students will study a problem from one of the areas of expertise stemming from their certificate(s) and/or minor(s).

Assessment Template: https://www.wku.edu/academicaffairs/ee/assurance_learning_resources.php

Upload Assessment Plan [Curriculum map - Data Science.xlsx](#)
[data science ASL template.docx](#)

Change in Discipline (If the program is being proposed to meet changes in the academic discipline, please outline those changes and explain why they necessitate development of a new program.)

Specify any distinctive qualities of the program.

The program is designed to be highly modifiable to allow students to stack multiple credentials. Typically, data science programs are housed in statistics and computer science departments, offering degrees that allow students to earn “deep” knowledge of the discipline. In the job market, the demands on employees with the title “data scientist” are different – they tend to be more “broad” than “deep”, and that is the niche the program aims to fill. This major will give students the essential skills expected of a data scientist, which include computer programming in multiple languages, knowledge of database languages, cloud computing, data wrangling, statistics, econometrics, as well as calculus and linear algebra. These fundamental skills will be coupled with domain knowledge from various disciplines – the students will have to complete at least one certificate or a minor that complements their degree in data science.

Does the proposed program differ from existing programs in terms of curriculum, focus, objectives, etc.? Yes

Please explain This is the first such program to be offered at WKU. The closest related programs are a certificate in Business Data Analytics and a Bachelor of Science in Business Data Analytics. While the programs appear similar, there are fundamental differences between the two disciplines: Data analysts examine data to spot patterns, apply predictive analytic tools, and generate visual reports that aid businesses in formulating more strategic choices. In contrast, data scientists are responsible for designing and building new tools for modeling data, developing and adjusting algorithms and predictive models

Does the proposed program serve a different student population (i.e., students in a different geographic area, non-traditional students) from existing programs? No

Is access to existing programs limited? No

Describe how the proposed program will articulate with related programs in the state. It should describe the extent to which students transfer has been explored and coordinated with other institutions.

Currently, there are two existing data programs in the state of Kentucky at EKU and NKU and one under development at UK. EKU's program is housed within the Department of Mathematics and Statistics and is named Data Science and Statistics. NKU's program is at the College of Informatics. UK's proposed program will be housed in the College of Arts and Sciences.

WKU's program will be a collaborative effort between the Gordon Ford College of Business and Ogden College of Science and Engineering. The intent of WKU's proposed program is to create a truly interdisciplinary major that will prepare students for jobs in the field of data science. Data scientists occupy a variety of jobs, some of which require in-depth knowledge of a specific field such as natural language processing or artificial intelligence. Another, and possibly larger segment of the data science professionals requires individuals to be jacks-of-all-trades because their jobs require creating and maintaining databases, developing workflows for data collection and analysis, developing ad-hoc analyses for specific problems, finetuning algorithms that have been put in production, and many other tasks. These kinds of jobs rely on individuals having knowledge in all of these areas, and that's the area WKU's proposed program is designed to address. Additionally, by requiring courses that go hand-in-hand with data-driven disciplines such as data analytics, computer science, economics, and GIS, the students will be required to couple their knowledge of data science with at least one other discipline. This is what the data scientists refer to as “domain knowledge” – a successful data scientist is expected to be proficient in data skills and to understand the context within which data science will be

used. The students will also have an opportunity to expand their domain knowledge into multiple areas by earning more than one certificate or a minor in addition to their data science major.

The key features of the existing and proposed programs are outlined in the table below. This table does not include every characteristic of each program as it is somewhat difficult to draw direct comparisons between the programs due to their design, course naming conventions, and course content.

EKU NKU UK WKU
 Calculus I X X X X
 Calculus II X X X No
 Applied Statistics X X X X
 Linear Algebra X X X X
 Regression Analysis X Optional X X
 Statistics with SAS Optional No No X
 Data Structures and Programming X X No X
 Machine Learning X Optional X X
 Data Wrangling No X X X
 Data Analytics and Visualization No X X X
 Data Mining No X No X
 Big Data No X No X
 Probability and Statistics No X No Optional

The courses in the WKU's program overlap with coursework in other programs in the state, offering opportunities for students to transfer courses between institutions. The design of the program is most similar to that of NKU which has a core set of classes combined with three application areas. The distinction between the WKU's program and NKU's data science program is in the emphasis on different skill sets: While NKU's program places a strong emphasis on computer science (15 credit hours) and mathematics and statistics (18 credit hours), WKU's program is designed to provide students with the flexibility to develop either of those skills through certificates or minors. Instead of having a number of dedicated computer language classes, the students will learn how to program in R, Python, SAS, and SQL throughout the program – the computer language skills will be embedded in most of the courses in the program. The program at WKU also allows students to pursue more than one application area such as GIS, business data analytics, or economic data analytics through certificates and minors. Therefore, the students at WKU's program will have a smaller core set of classes compared to NKU and will give students an opportunity to stack multiple credentials that will complement their major.

EKU's program resides in the Department of Mathematics and Statistics. The program offers a strong emphasis on statistics and not as much emphasis on computer science as the program at NKU. The distinctive characteristics between WKU's and ECU's programs are WKU will require courses that use SAS (a statistical software used in this field) while at ECU that course is optional; WKU's program will include courses on data visualization, data wrangling, and data mining. At ECU some of these courses are not included in the program or are optional. The structure of WKU's program will be different as well – WKU's program will have a small core set of classes and will allow students to choose one or more areas of specialization that will be earned through certificates and minors.

Describe student demand data for this program.

Please see the attachment below.

Describe workforce needs and career outcomes for graduates of this program.

Please see the attachment below.

Will this program replace or enhance any existing program(s) or concentration(s) within an existing program? No

Program Demand [Demand Estimates.docx](#)
 Data and Support
 Documents

Delivery Mode

Is 25% or more of this program offered at a location other than main campus?

No

Enter Location(s)
 and Percentage of
 Program Offered at
 Location(s)

Location	Percentage
WKU Main Campus	100

Is 50% or more of this program offered by distance education (online asynchronous, online synchronous, connected classrooms, etc.)?

No

Do you plan to offer 100% of this program online?

No

If no, enter the percentage of the program that will be taught online.

0

Do you plan to offer 100% of this program face-to-face?

Yes

Do you plan to offer at least 25% of this program as a direct assessment competency-based educational program?

No

See the SACSCOC Policy on Direct Assessment Competency-based Educational Programs.
<https://www.sacscoc.org/pdf/081705/DirectAssessmentCompetencyBased.pdf>

Library Resources

Attach library resources [Data Science Library needs.docx](#)

Rationale for the program proposal?

Currently, there is a significant amount of expertise across various disciplines offered at WKU which allows us to build this program almost exclusively with existing resources. The Analytics and Information Systems faculty possess knowledge of data analysis, data visualization, cyber-security, and many other applied data disciplines. The Economics faculty can offer expertise in advanced statistics with applications to business, while the Computer Science faculty can teach courses that go into significant depth in programming languages, data storage, and computer hardware. The Mathematics department faculty can offer courses in not only mathematics but also statistics. Therefore, the building blocks for creating this program are already in place, including virtually all of the courses that will be offered. Thus, the impact on the cost side is minimal, while on the revenue side, it could be significant if the program attracts new students who would not have attended WKU otherwise, and offers an opportunity to earn this degree within the state of Kentucky for those students who are considering similar programs out-of-state. And, while we strongly believe that this program will be successful, in the event of low enrollments, it will be easy enough to unwind, without placing a large financial burden on the university. Therefore, this program has very little downside risk, while offering a significant potential for growth.

CPE Proposal [CPE Notification of Intent Form 2023 Data Science.docx](#)

Additional Attachments

Additional information or attachments

Reviewer Comments

Course Change Request

New Course Proposal

Date Submitted: 10/20/23 6:56 pm

Viewing: **MATH 112E : Problem Solving and Mathematical Skills for Teachers**

Also listed as: **MATH 112**

Last revision: 10/20/23 6:56 pm

Changes proposed by: ptr05178

Proposed Action

Active

Contact(s)

Name	E-mail	Phone
Patrick Brown	patrick.brown@wku.edu	2707456247

Term for implementation Fall 2024

Academic Level Undergraduate

Course prefix (subject area) MATH - Mathematics (Univ) Course number 112E

Department Mathematics

College Science and Engineering

Course title
Problem Solving and Mathematical Skills for Teachers

Abbreviated course title PROB SOLV & MATH SKILLS TCHRS

In Workflow

1. MATH Approval
2. SC Dean
3. SC Curriculum Committee
4. Provost
5. Course Inventory

Approval Path

1. 10/20/23 7:50 pm
Kanita DuCloux
(kanita.ducloux):
Approved for MATH Approval
2. 10/30/23 9:09 am
Stuart Burris
(stuart.burris):
Approved for SC Dean

Course description

Development of mathematical skills and problem-solving techniques necessary for pre-service teachers. Topics include: number and algebra, geometry, probability and statistics.

Credit hours 3

Repeatable

Yes

Number of repeats 2

For maximum credits 3

Default grade type Standard Letter Alternate grade type(s)

Is this course intended to span more than one term?

No

Schedule type

Lecture/Lab

CIP Code 270101 - Mathematics, General.

Does this course have prerequisites

No

Corequisites

Equivalent Courses

MATH 112 Department
 Mathematics
 College

Restrictions:

College restriction? No

Field of study
restriction/major? No

Classification
restriction? No

Departmental
Restrictions

Reason for
developing the
proposed course

Pursuant to discussions with the Registrar and Colonnade committee leadership, the creation of MATH 112E is intended to proceed through the curricular process as expedited review, as the course is identical to MATH 112 in both content and rigor. The only difference is that 112E will include integrated academic support.

This will not be a new course. We're changing the way we differentiate the academic support sections of MATH 112 to match the other Quantitative Reasoning courses in our department. Previously some sections of MATH 112 were designated for students requiring academic support while other sections were for college-ready students. We would like to designate the sections for students requiring academic support as MATH 112E for clarity and uniformity (e.g. MATH 116/116E, MATH 115/115E, MATH 109/109E).

Is this related to
other courses at
WKU?

No

What departments/programs have been consulted concerning potential impact (e.g. to possible duplication or conflict, changed corequisite or prerequisite for equivalent courses, etc.)? Please provide names and dates for individuals consulted.

None. This is an internal change in the way we're listing the course, but not an actual change in our offerings that will affect any other department.

How many sections
of this course per
academic year will
be offered?

3

How many students
per section are
expected to enroll in
this proposed
course?

24

How many students
per academic year
are expected to
enroll?

72

How were these
projections
calculated? Explain
any supporting
evidence/data you

have for arriving at
these projections:

We currently offer 3 sections of MATH 112 for students requiring academic support per year, 2 in the Fall and 1 in the Spring.

Is this course part of a program that leads to teacher certificate? No

Are you seeking Colonnade approval for this course? No

Foundations: Course Categories Quantitative Reasoning

Student Learning Outcomes

#	Student Learning Outcomes
1	Interpret information presented in mathematical and/or statistical forms.
2	Illustrate and communicate mathematical and/or statistical information symbolically, visually and/or numerically.
3	Determine when computations are needed and execute the appropriate computations.
4	Apply an appropriate model to the problem to be solved.
5	Make inferences, evaluate assumptions, and assess limitations in estimation modeling and/or statistical analysis.

Content outline

#	Topic
1	Problem Solving Strategies & Methods
2	Operations of Addition, Subtraction, Multiplication, & Division
3	Whole number, integer, and rational number systems.
4	Ratios, Proportions, & Percents
5	Introductory Algebraic Reasoning
6	Introductory Geometry & Measurement
7	Introductory Probability, Statistics, & Data Analysis

Student expectations and requirements

Tentative texts and
course materials

Skills Review for Mathematics for Elementary Teachers, 4th Edition, 2013, Beckmann

Special equipment,
materials, or library
resources needed

None

Additional
information

Supporting
documentation

Reviewer Comments

Key: 9748

Course Change Request

New Course Proposal

Date Submitted: 10/22/23 11:56 am

Viewing: **MATH 123E : Mathematical Applications for Business**

Last revision: 10/22/23 11:56 am

Changes proposed by: lsl10975

In Workflow

1. **MATH Approval**
2. **SC Dean**
3. **SC Curriculum Committee**
4. Provost
5. Course Inventory

Proposed Action

Approval Path

1. 10/17/23 9:39 am
Kanita DuCloux
(kanita.ducloux):
Approved for MATH Approval
2. 10/17/23 10:12 am
Stuart Burris
(stuart.burris):
Rollback to Initiator
3. 10/25/23 8:56 am
Kanita DuCloux
(kanita.ducloux):
Approved for MATH Approval
4. 10/30/23 9:09 am
Stuart Burris
(stuart.burris):
Approved for SC Dean

Active

Contact(s)

Name	E-mail	Phone
Leslie Plumlee	leslie.plumlee@wku.edu	270-303-6147
Robin Ayers	robin.ayers@wku.edu	270-745-5009

Term for implementation Fall 2024

Academic Level Undergraduate

Course prefix (subject area) MATH - Mathematics (Univ) Course number 123E
 Department Mathematics
 College Science and Engineering
 Course title
 Mathematical Applications for Business
 Abbreviated course title MATHEMATICAL APPS FOR BUSINESS

Course description

Business applications of linear, quadratic, exponential and logarithmic functions, plus a brief introduction to probability, the mathematics of finance, and derivatives as they apply to problem-solving strategies in business-related fields.

Credit hours 3

Repeatable

Yes

Number of repeats 2

For maximum credits 3

Default grade type Standard Letter Alternate grade type(s)

Is this course intended to span more than one term?

No

Schedule type

Lecture

CIP Code 270399 - Applied Mathematics, Other.

Does this course have prerequisites

Yes

Prerequisites

And/Or	(	Course/Test Code	Min Grade/Score	Academic Level	)	Concurrency?

Corequisites

Equivalent Courses

Restrictions:

College restriction? No

Field of study
restriction/major? No

Classification
restriction? No

Departmental
Restrictions

Reason for
developing the
proposed course

Pursuant to discussions with the Registrar and Colonnade committee leadership, the creation of MATH 123E is intended to proceed through the curricular process as expedited review, as the course is identical to MATH 123 in both content and rigor. The only difference is that 123E will include integrated academic support.

Currently, students who do not meet any of the placement criteria for MATH 123 are required to enroll in MATH 105 as a corequisite to MATH 123 in order to receive the additional academic support they require. MATH 123E will fold the extra support hour into the same course and will facilitate ease of scheduling these students.

In addition, creating the MATH 123/123E structure will establish consistency with other offerings in the Mathematics Department (e.g. MATH 116/116E, MATH 115/115E, MATH 109/109E).

Is this related to
other courses at
WKU?

No

What departments/programs have been consulted concerning potential impact (e.g. to possible duplication or conflict, changed corequisite or prerequisite for equivalent courses, etc.)? Please provide names and dates for individuals consulted.

Evelyn Thrasher, GFCB, April 6-7, 2023

Ashley Smith, GFCB, April 6-7, 2023

Jennifer Hammonds, Registrar, August 31, 2023

Stacey Forsythe, Colonnade Chair, Oct 17, 2023

How many sections
of this course per
academic year will
be offered?

6

How many students per section are expected to enroll in this proposed course?

40

How many students per academic year are expected to enroll?

240

How were these projections calculated? Explain any supporting evidence/data you have for arriving at these projections:

Based on the current number of MATH 123 Sections that are paired with a corequisite MATH 105.

Is this course part of a program that leads to teacher certificate? No

Are you seeking Colonnade approval for this course? No

Foundations: Course Categories Quantitative Reasoning

Student Learning Outcomes

#	Student Learning Outcomes
1	Interpret information presented in mathematical and/or statistical forms.
2	Illustrate and communicate mathematical and/or statistical information symbolically, visually and/or numerically.
3	Determine when computations are needed and execute the appropriate computations.
4	Apply an appropriate model to the problem to be solved.
5	Make inferences, evaluate assumptions, and assess limitations in estimation modeling and/or statistical analysis.

Content outline

#	Topic
1	Linear Functions & Applications
2	Linear Regression
3	Quadratic Functions & Applications
4	Simple Interest
5	Compound Interest
6	Future Value of Annuity
7	Present Value of Annuity
8	First Derivative & Marginal Analysis
9	Introduction to Probability

Student expectations and requirements

Tentative texts and course materials

College Mathematics for Business, Economics, Life Sciences, and Social Sciences 14th Edition
Author(s): Barnett, Raymond | Ziegler, Michael | Byleen, Karl | Stocker, Christopher

Special equipment, materials, or library resources needed
Graphing calculator required.

Additional information

Supporting documentation

Reviewer Comments

Stuart Burris (stuart.burris) (10/17/23 10:12 am): Rollback: Rolled back per request.

Key: 9750

Course Change Request

Date Submitted: 10/20/23 4:03 pm

Viewing: **MATH 382 : Probability and Statistics I**

Also listed as: **ACTU 382**

Last revision: 10/20/23 4:03 pm

Changes proposed by: mln27164

Catalog Pages referencing this course

MATH 382:
[Department of Mathematics](#)

Proposed Action

Active

Contact(s)

Name	E-mail	Phone
Melanie Autin	melanie.autin@wku.edu	270-745-6171

Review Type

[Full Review](#)

Term for implementation

Fall 2024

Academic Level

Undergraduate

Course prefix (subject area)

MATH - Mathematics (Univ)

Course number 382

Department

Mathematics

College

Science and Engineering

In Workflow

1. **MATH Approval**
2. **SC Dean**
3. **SC Curriculum Committee**
4. Undergraduate Curriculum Committee
5. University Senate
6. Provost
7. Course Inventory

Approval Path

1. 10/20/23 7:44 pm
Kanita DuCloux (kanita.ducloux):
Approved for MATH Approval
2. 10/30/23 9:10 am
Stuart Burris (stuart.burris):
Approved for SC Dean

Course title

Probability and Statistics I

Abbreviated course title PROBABILITY AND STATISTICS I

Course description

Axioms and laws of probability; discrete and continuous probability distributions; multivariate distributions; random variables; expectation; moment generating functions; Central Limit Theorem.

Credit hours 3

Repeatable

Yes

Number of repeats 2

For maximum credits 3

Default grade type Standard Letter Alternate grade type(s)

Is this course intended to span more than one term?

No

Schedule type

Lecture

CIP Code 270101 - Mathematics, General.

Does this course have prerequisites

Yes

Prerequisites

And/Or	(	Course/Test Code	Min Grade/Score	Academic Level	)	Concurrency?
		MATH 310	C	UG		
And		MATH 237	D	UG		Yes

Corequisites

Equivalent Courses

[ACTU 382](#)

Department

[Mathematics](#)

College

[Science and Engineering](#)

Restrictions:

College restriction? No

Field of study
restriction/major? NoClassification
restriction? NoDepartmental
RestrictionsReason for changing
the course[Adding student learning outcomes and content outline.](#)[We are adding/creating ACTU 382 as an equivalent course. This equivalent course will now be required for students majoring in Mathematical Economics with a concentration in Actuarial Science. This prefix will allow current and prospective students to see that courses in the program are preparing them for actuary exams and their future careers as actuaries.](#)Is this related to
other courses at
WKU?

No

What departments/programs have been consulted concerning potential impact (e.g. to possible duplication or conflict, changed corequisite or prerequisite for equivalent courses, etc.)? Please provide names and dates for individuals consulted.

[ACTU 382 discussed with ECON \(David Zimmer and Alex Lebedinsky\) in February 2023 and September 2023.](#)Is this course part of
a program that leads
to teacher
certificate? NoAre you seeking
Colonnade approval
for this course? NoStudent Learning
Outcomes

#	Student Learning Outcomes
<u>1</u>	<u>Demonstrate an understanding of the fundamental principles of probability.</u>
<u>2</u>	<u>Use the properties of discrete and continuous random variables with their joint, marginal, and conditional distributions.</u>
<u>3</u>	<u>Use the various families of probability distributions to model various types of data.</u>
<u>4</u>	<u>Demonstrate skills in problem solving by writing of clear, complete, logically correct solutions.</u>

Content outline

#	Topic
<u>1</u>	<u>Probability</u> <ul style="list-style-type: none"> • <u>Probability axioms</u> • <u>Counting methods</u> • <u>Conditional probability</u> • <u>Independent events</u> • <u>Bayes' Theorem</u>
<u>2</u>	<u>Discrete Distributions</u> <ul style="list-style-type: none"> • <u>Expectations</u> • <u>Moment-generating functions</u> • <u>Discrete uniform, Bernoulli, binomial, hypergeometric, geometric, negative binomial, and Poisson distributions</u>
<u>3</u>	<u>Continuous Distributions</u> <ul style="list-style-type: none"> • <u>Expectations</u> • <u>Exponential, gamma, chi-square, and normal distributions</u>
<u>4</u>	<u>Bivariate Distributions</u> <ul style="list-style-type: none"> • <u>Discrete bivariate distributions</u> • <u>Continuous bivariate distributions</u> • <u>Covariance and correlation</u> • <u>Conditional distributions</u> • <u>Bivariate normal distribution</u>
<u>5</u>	<u>Distributions of Functions of Random Variables (as time allows)</u> <ul style="list-style-type: none"> • <u>Functions of one random variable</u> • <u>Transformations of two random variables</u> • <u>Functions of several independent random variables</u> • <u>The Central Limit Theorem</u> • <u>Markov's Inequality and Chebyshev's Inequality</u>

Student
expectations and
requirements

Tentative texts and
course materials

Special equipment,
materials, or library
resources needed

Additional
information

Supporting
documentation

Reviewer Comments

Key: 5836

Course Change Request

Date Submitted: 10/20/23 4:04 pm

Viewing: **MATH 482 : Probability and Statistics II**

Also listed as: **ACTU 482**

Last revision: 10/20/23 4:04 pm

Changes proposed by: mln27164

Catalog Pages
referencing this
course

MATH 482:
[Department of Mathematics](#)

Proposed Action

Active

Contact(s)

Name	E-mail	Phone
Melanie Autin	melanie.autin@wku.edu	270-745-6171

Review Type

[Full Review](#)

Term for
implementation

Fall 2024

Academic Level

Undergraduate

Course prefix
(subject area)

MATH - Mathematics (Univ)

Course number 482

Department

Mathematics

College

Science and Engineering

In Workflow

1. **MATH Approval**
2. **SC Dean**
3. **SC Curriculum Committee**
4. Undergraduate Curriculum Committee
5. University Senate
6. Provost
7. Course Inventory

Approval Path

1. 10/20/23 7:40 pm
Kanita DuCloux (kanita.ducloux):
Approved for MATH Approval
2. 10/30/23 9:10 am
Stuart Burris (stuart.burris):
Approved for SC Dean

Course title

Probability and Statistics II

Abbreviated course title PROBABILITY AND STATISTICS II

Course description

Multivariate probability distributions; sampling distributions, statistical inference; point and interval estimation, properties of estimators; hypothesis testing; regression and correlation; analysis of variance; non-parametric methods.

Credit hours 3

Repeatable

Yes

Number of repeats 2

For maximum credits 3

Default grade type Standard Letter Alternate grade type(s)

Is this course intended to span more than one term?

No

Schedule type

Lecture

CIP Code 270101 - Mathematics, General.

Does this course have prerequisites

Yes

Prerequisites

And/Or	(	Course/Test Code	Min Grade/Score	Academic Level	)	Concurrency?
		MATH 237	C	UG		
And		MATH 382	C	UG		

Corequisites

Equivalent Courses

[ACTU 482](#)

Department

[Mathematics](#)

College

Science and Engineering**Restrictions:**

College restriction? No

Field of study
restriction/major? NoClassification
restriction? NoDepartmental
RestrictionsReason for changing
the courseAdding student learning outcomes and content outline.We are adding/creating ACTU 482 as an equivalent course. This equivalent course will now be required for students majoring in Mathematical Economics with a concentration in Actuarial Science. This prefix will allow them to see that courses in the program are preparing them for actuary exams and their future careers as actuaries.Is this related to
other courses at
WKU?
No

What departments/programs have been consulted concerning potential impact (e.g. to possible duplication or conflict, changed corequisite or prerequisite for equivalent courses, etc.)? Please provide names and dates for individuals consulted.

ACTU 482 discussed with ECON (David Zimmer and Alex Lebedinsky) in February 2023 and September 2023.Is this course part of
a program that leads
to teacher
certificate? NoAre you seeking
Colonnade approval
for this course? NoStudent Learning
Outcomes

#	Student Learning Outcomes
<u>1</u>	<u>Find the distribution of a function of random variables using the methods of distribution functions, transformations, and/or moment generating functions; perform bivariate transformations.</u>
<u>2</u>	<u>Apply the Central Limit Theorem to calculate probabilities and quantiles for the sample mean.</u>
<u>3</u>	<u>Determine properties of point estimators; find minimum variance unbiased estimators; find method of moments and maximum likelihood estimators.</u>
<u>4</u>	<u>Construct point and interval estimators.</u>
<u>5</u>	<u>Perform one- and two-sample hypothesis tests for the mean, proportion, standard deviation, and variance.</u>
<u>6</u>	<u>Perform chi-square goodness-of-fit tests and tests of independence.</u>
<u>7</u>	<u>Demonstrate skills in problem solving by writing of clear, complete, logically correct solutions.</u>

Content outline

#	Topic
<u>1</u>	<u>Distributions of Functions of Random Variables</u> <ul style="list-style-type: none"> • <u>Functions of one random variable</u> • <u>Transformations of two random variables</u> • <u>Functions of several independent random variables</u> • <u>The Central Limit Theorem</u> • <u>Markov's Inequality and Chebyshev's Inequality</u>
<u>2</u>	<u>Point Estimation</u> <ul style="list-style-type: none"> • <u>Maximum likelihood estimation</u> • <u>Method of moments estimation</u> • <u>Sufficient statistics</u> • <u>Minimum variance unbiased estimators</u> • <u>Bayesian estimation</u> • <u>Simple linear regression</u>
<u>3</u>	<u>Interval Estimation</u> <ul style="list-style-type: none"> • <u>Confidence intervals for means</u> • <u>Confidence intervals for proportions</u> • <u>Confidence intervals for variances</u>
<u>4</u>	<u>Hypothesis Testing</u> <ul style="list-style-type: none"> • <u>Hypothesis tests for means</u> • <u>Hypothesis tests for proportions</u> • <u>Hypothesis tests for variances</u> • <u>Chi-square goodness-of-fit tests</u> • <u>Chi-square tests of independence</u>

Student expectations and requirements

Tentative texts and
course materials

Special equipment,
materials, or library
resources needed

Additional
information

Supporting
documentation

Reviewer Comments

Key: 5875

Program Change Request

Date Submitted: 10/20/23 7:09 pm

Viewing: ~~528P~~, **528 : Mathematics, Bachelor of Arts**

Last approved: 04/12/23 3:41 pm

Last edit: 10/20/23 7:09 pm

Changes proposed by: ptr05178

Using this Program

In Workflow

1. **MATH Approval**
2. **SC Dean**
3. **SC Curriculum Committee**
4. Undergraduate Curriculum Committee
5. University Senate
6. Provost
7. Program Inventory

Proposed Action	Active						
Contact Person	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">Name</th> <th style="width: 35%;">Email</th> <th style="width: 35%;">Phone</th> </tr> </thead> <tbody> <tr> <td>Patrick Brown</td> <td>patrick.brown@wku.edu</td> <td>2707456247</td> </tr> </tbody> </table>	Name	Email	Phone	Patrick Brown	patrick.brown@wku.edu	2707456247
Name	Email	Phone					
Patrick Brown	patrick.brown@wku.edu	2707456247					
Term of Implementation	2024-2025						
Program Reference Number	528P ; 528						
Review Type	Full Review						
Academic Level	Undergraduate						
Program Type	Major						
Degree Types	Bachelor of Arts						
Department	Mathematics						
College	Science and Engineering						
Program Name (eg. Biology)	Mathematics, Bachelor of Arts						
Will this program have concentrations?	Yes						
Concentrations							

Approval Path

1. 10/20/23 7:29 pm
Kanita DuCloux (kanita.ducloux):
Approved for MATH Approval
2. 10/30/23 9:07 am
Stuart Burris (stuart.burris):
Approved for SC Dean

History

1. May 25, 2021 by Rheanna Plemons (rheanna.plemons)
2. Sep 27, 2021 by Jennifer Hammonds (jennifer.hammonds)
3. Mar 7, 2022 by Jessica Dorris (jessica.dorris)
4. Jul 20, 2022 by Ryan Wilson (ryan.wilson)
5. Apr 12, 2023 by Jennifer Hammonds (jennifer.hammonds)

Concentrations

Fundamental Analysis & Discrete (MAAD)
 Fundamentals of Applied Mathematics (MAAM)
 Fundamentals of Math Studies (MAMS)

CIP Code 27.0101 - Mathematics, General.

Will this program lead to teacher certification? No

Does the proposed program contain 25% or more new content not previously taught in another course at WKU? If yes, contact the Office of the Provost for additional SACSCOC proposal requirements

No

Catalog Content

Program Overview (Catalog field: Overview tab)

This major is for students that intend to pursue a graduate degree in mathematics, and/or intend to pursue employment in business and industry. This major does not lead to teacher certification.

Curriculum Requirements (Catalog field: Program Requirements)

~~Admission Requirements To be fully admitted to the majors in mathematics with reference number 528, students must complete the following admission requirements: Earn a "C" or better in each of the following courses: MATH 136, MATH 137, and MATH 307 (or MATH 310). Have an overall GPA of at least 2.4 in the mathematics program courses completed prior to admission (MATH 136, MATH 137, and MATH 307 (or MATH 310)). Note: If a course is repeated, then the second grade is used to compute the GPA. If a course is repeated multiple times, then the average of all grades after the first attempt is used to compute the GPA. Students can earn a grade in a course a maximum of threetimes.~~ Program Requirements (51 hours)

Approved Shared Content from /shared/undergraduate-major-requirements/

Last Approved: Jul 6, 2023 12:58pm

A baccalaureate degree requires a minimum of 120 unduplicated semester hours. More information can be found at www.wku.edu/registrar/degree_certification.php.

Students who began WKU in the Fall 2014 and thereafter should review the Colonnade requirements located at: <https://www.wku.edu/colonnade/colonnaderequirements.php>.

A major in mathematics provides a Bachelor of Arts degree and requires either a minimum of 36-39 semester hours for a general major with a minor or second major or a minimum of 51 semester hours for an extended major. Note: All mathematics courses listed as prerequisites for other mathematics courses must have been completed with a grade of "C" or better.

~~Students who wish to declare a 528 mathematics major will initially be designated as "seeking admission" until the following requirements have been satisfied: Complete MATH 136, MATH 137, and MATH 307 or MATH 310, with a grade of "C" or better in each course. Have an overall GPA of at least 2.4 in mathematics program courses (MATH 136 and above) completed prior to admission.~~ Students in the extended major (528) are required to satisfy a computational requirement by completing two courses chosen from [CS 180](#), [CS 290](#), [STAT 330](#), [MATH 371](#), [PHYS 316](#), or [PHYS 318](#). [If [MATH 371](#) is selected to fulfill this requirement, it cannot also be used as an elective in the extended major (528).]

To prepare for graduate study in mathematics, the student must complete a minimum of 51 hours of mathematics with the following requirements:

Core Courses

MATH 136	Calculus I	4
MATH 137	Calculus II	4
MATH 237	Multivariable Calculus	4
MATH 307	Introduction to Linear Algebra	3
MATH 310	Introduction to Discrete Mathematics	3
MATH 317	Introduction to Algebraic Systems	3
MATH 337	Elements of Real Analysis	3
MATH 431	Intermediate Analysis I	3
MATH 498	Senior Seminar	1-3
Total Hours		28-30

Select one of the following concentrations:

B1: Fundamentals of Analysis and Discrete Mathematics

MATH 417	Algebraic Systems	3
MATH 439	Topology I	3
MATH 450	Complex Variables	3

Select two of the following:

MATH 315	Theory of Numbers	6
MATH 323	Geometry I	
MATH 415	Algebra and Number Theory	

MATH 423	Geometry II	
MATH 473	Introduction to Graph Theory	
Select six elective hours from the following:		6
MATH 275	Introductory Topics in Mathematics (up to 3 hours)	
STAT 301	Introductory Probability and Applied Statistics	
MATH 305	Introduction to Mathematical Modeling	
MATH 315	Theory of Numbers	
MATH 323	Geometry I	
MATH 331	Differential Equations	
MATH 370	Applied Techniques in Mathematics	
MATH 371	Advanced Computational Problem Solving (provided MATH 371 was not used to satisfy the computational requirement)	
MATH 382	Probability and Statistics I	
MATH 398	Seminar (up to 3 hours)	
MATH 405	Numerical Analysis I	
MATH 406	Numerical Analysis II	
MATH 409	History of Mathematics	
MATH 415	Algebra and Number Theory	
MATH 423	Geometry II	
MATH 435	Partial Differential Equations	
MATH 470	Introduction to Operations Research	
MATH 473	Introduction to Graph Theory	
MATH 475	Selected Topics in Mathematics (up to 6 hours)	
MATH 482	Probability and Statistics II	
Total Hours		21
B2: Fundamentals of Applied Mathematics		
MATH 331	Differential Equations ¹	3
MATH 370	Applied Techniques in Mathematics ¹	3
MATH 382	Probability and Statistics I ¹	3
MATH 405	Numerical Analysis I ¹	3
Select two of the following: ¹		6
MATH 305	Introduction to Mathematical Modeling	
MATH 406	Numerical Analysis II	
MATH 435	Partial Differential Equations	
MATH 470	Introduction to Operations Research	
MATH 482	Probability and Statistics II	
Select three credit hours of the following:		3
MATH 275	Introductory Topics in Mathematics	
STAT 301	Introductory Probability and Applied Statistics	
MATH 305	Introduction to Mathematical Modeling	
MATH 315	Theory of Numbers	
MATH 323	Geometry I	
MATH 371	Advanced Computational Problem Solving (provided MATH 371 was not used to satisfy the computational requirement)	
MATH 398	Seminar	
MATH 406	Numerical Analysis II	
MATH 409	History of Mathematics	
MATH 415	Algebra and Number Theory	
MATH 417	Algebraic Systems	
MATH 423	Geometry II	

MATH 435	Partial Differential Equations	
MATH 439	Topology I	
MATH 450	Complex Variables	
MATH 470	Introduction to Operations Research	
MATH 473	Introduction to Graph Theory	
MATH 475	Selected Topics in Mathematics	
MATH 482	Probability and Statistics II	
Total Hours		21
B3: Fundamentals of Mathematical Studies		
MATH 450	Complex Variables	3
Select two of the following:		6
MATH 405	Numerical Analysis I	
MATH 406	Numerical Analysis II	
MATH 409	History of Mathematics	
MATH 415	Algebra and Number Theory	
MATH 417	Algebraic Systems	
MATH 423	Geometry II	
MATH 435	Partial Differential Equations	
MATH 439	Topology I	
MATH 470	Introduction to Operations Research	
MATH 473	Introduction to Graph Theory	
MATH 482	Probability and Statistics II	
Select twelve elective hours of the following:		12
MATH 275	Introductory Topics in Mathematics (up to 3 hours)	
STAT 301	Introductory Probability and Applied Statistics	
MATH 305	Introduction to Mathematical Modeling	
MATH 315	Theory of Numbers	
MATH 323	Geometry I	
MATH 331	Differential Equations	
MATH 370	Applied Techniques in Mathematics	
MATH 371	Advanced Computational Problem Solving (provided MATH 371 was not used to satisfy the computational requirement)	
MATH 382	Probability and Statistics I	
MATH 398	Seminar (up to 3 hours)	
MATH 405	Numerical Analysis I	
MATH 406	Numerical Analysis II	
MATH 409	History of Mathematics	
MATH 415	Algebra and Number Theory	
MATH 423	Geometry II	
MATH 435	Partial Differential Equations	
MATH 470	Introduction to Operations Research	
MATH 473	Introduction to Graph Theory	
MATH 475	Selected Topics in Mathematics (up to 6 hours)	
MATH 482	Probability and Statistics II	
Total Hours		21

1

Students may take certain 500-level mathematics courses for undergraduate credit in place of courses listed in items B1i, B1ii, B2i, B2ii, B3i, or B3ii with the approval of the mathematics department chair. No minor or second major for the extended major is required.

4-Year Plan

Fundamentals of Analysis & Discrete Mathematics Concentration

First Year			
Fall	Hours	Spring	Hours
MATH 136	4	MATH 137	4
CS 180	4	CS 290, STAT 330, or MATH 371	3-4
ENG 100	3	COMM 145	3
Colonnade - Natural & Physical Sciences w/ lab	3-5	HIST 101 or HIST 102	3
		Colonnade - Social & Behavioral Science	3
	14-16		16-17
Second Year			
Fall	Hours	Spring	Hours
MATH 307	3	MATH 237	4
MATH 310	3	Math upper-division Elective	3
ENG 200	3	Colonnade - Natural & Physical Sciences w/ no lab3	3
Colonnade - Arts & Humanities	3	Colonnade - Writing in the Disciplines	3
World Language Requirement or General Elective	3	General Elective	3
	15		16
Third Year			
Fall	Hours	Spring	Hours
MATH 317	3	MATH 337	3
Math upper-division Elective	3	MATH 417	3
Colonnade - Social & Cultural	3	Colonnade - Local to Global	3
Colonnade - Systems	3	General Elective	3
General Elective	3	General Elective	3
	15		15
Fourth Year			
Fall	Hours	Spring	Hours
MATH 431	3	MATH 450	3
MATH 439	3	MATH 498	3
Math upper-division Elective	3	Math upper-division Elective	3
General Elective	3	General Elective	3
General Elective	2	General Elective	3
	14		15
Total Hours 120-123			

Fundamentals of Applied Math Concentration

First Year			
Fall	Hours	Spring	Hours
MATH 136	4	MATH 137	4
CS 180	4	CS 290, STAT 330, or MATH 371	3-4
ENG 100	3	COMM 145	3
Colonnade - Natural & Physical Sciences w/ lab	3-5	HIST 101 or HIST 102	3
		Colonnade - Social & Behavioral Science	3
	14-16		16-17
Second Year			
Fall	Hours	Spring	Hours
MATH 307	3	MATH 237	4
MATH 310	3	MATH 331	3
ENG 200	3	Math upper-division Elective	3
Colonnade - Arts & Humanities	3	Colonnade - Natural & Physical Sciences w/ no lab3	3
World Language Requirement or General Elective	3	Colonnade - Writing in the Disciplines	3
	15		16
Third Year			
Fall	Hours	Spring	Hours
MATH 317	3	MATH 337	3
MATH 382	3	MATH 370	3
MATH 405	3	Colonnade - Local to Global	3
Colonnade - Social & Cultural	3	Colonnade - Systems	3
General Elective	3	General Elective	3
	15		15
Fourth Year			
Fall	Hours	Spring	Hours
MATH 431	3	MATH 498	3
Math upper-division Elective	3	Math upper-division Elective	3
General Elective	3	General Elective	3
General Elective	3	General Elective	3
General Elective	2	General Elective	3
	14		15
Total Hours 120-123			

Fundamentals of Math Studies Concentration

First Year			
Fall	Hours	Spring	Hours
MATH 136	4	MATH 137	4
CS 180	4	CS 290, STAT 330, or MATH 371	3-4
ENG 100	3	COMM 145	3
Colonnade - Natural & Physical Sciences w/ lab	3-5	HIST 101 or HIST 102	3
		Colonnade - Social & Behavioral Science	3
	14-16		16-17
Second Year			
Fall	Hours	Spring	Hours
MATH 307	3	MATH 237	4
MATH 310	3	Math upper-division Elective	3
ENG 200	3	Math upper-division Elective	3
Colonnade - Arts & Humanities	3	Colonnade - Natural & Physical Sciences w/ no lab3	3
World Language Requirement or General Elective	3	Colonnade - Writing in the Disciplines	3
	15		16
Third Year			
Fall	Hours	Spring	Hours
MATH 317	3	MATH 337	3
Math upper-division Elective	3	MATH 450	3
Colonnade - Local to Global	3	Math upper-division Elective	3
Colonnade - Social & Cultural	3	Colonnade - Systems	3
General Elective	3	General Elective	3
	15		15
Fourth Year			
Fall	Hours	Spring	Hours
MATH 431	3	MATH 498	3
Math upper-division Elective	3	Math upper-division Elective	3
General Elective	3	General Elective	3
General Elective	3	General Elective	3
General Elective	2	General Elective	3
	14		15
Total Hours 120-123			

Will this program be managed or owned by more than one department?

No

Does this program include courses from outside your department?

Please insert one Learning Outcome per box. Click green plus sign for additional LO boxes

Learning Outcomes and Measurement Plan	List all student learning outcomes of the program.	Measurement Plan
SLO 1	Be prepared for employment in government, industry, or academic settings	Rubric measurement of their senior project in MATH 498 which consists of a 12-to-20-page paper and a 25-minute presentation of their senior project. Students will complete an exit survey. Request alumni to complete a post-graduation survey.
SLO 2	Use technology and apply mathematics to solve problems effectively.	Rubric measurement of their senior project in MATH 498 which consists of a 12-to-20-page paper and a 25-minute presentation of their senior project. Students will complete an exit survey. Request alumni to complete a post-graduation survey.
SLO 3	Utilize critical thinking and communicate ideas effectively.	Rubric measurement of their senior project in MATH 498 which consists of a 12-to-20-page

	List all student learning outcomes of the program.	Measurement Plan
		paper and a 25-minute presentation of their senior project.

Assessment Template: https://www.wku.edu/academicaffairs/ee/assurance_learning_resources.php

Upload Assessment Plan

Delivery Mode

Is 25% or more of this program offered at a location other than main campus?

No

Enter Location(s) and Percentage of Program Offered at Location(s)

Is 50% or more of this program offered by distance education (online asynchronous, online synchronous, connected classrooms, etc.)?

No

Do you plan to offer 100% of this program online?

No

If no, enter the percentage of the program that will be taught online.

0

Do you plan to offer 100% of this program face-to-face?

Yes

Do you plan to offer at least 25% of this program as a direct assessment competency-based educational program?

No

See the SACSCOC Policy on Direct Assessment Competency-based Educational Programs.

<https://www.sacscoc.org/pdf/081705/DirectAssessmentCompetencyBased.pdf>

Library Resources

Attach library resources

Rationale for the program proposal?

We want to do away with the admission requirements for the major, and erase the 528P designation. We view this distinction as an unnecessary hurdle for students and an unnecessary administrative burden for members of the faculty and staff.

Additional Attachments

Additional information or attachments

Reviewer Comments

Program Change Request

Date Submitted: 10/20/23 7:08 pm

Viewing: **728P, 728 : Mathematics, Bachelor of Arts**

Last approved: 06/08/23 11:40 am

Last edit: 10/20/23 7:08 pm

Changes proposed by: ptr05178

Catalog Pages [Mathematics, Bachelor of Arts \(728P, 728\)](#)
 Using this Program

In Workflow

1. **MATH Approval**
2. **SC Dean**
3. **SC Curriculum Committee**
4. Professional Education Council
5. Undergraduate Curriculum Committee
6. University Senate
7. Provost
8. Program Inventory

Proposed Action: Active

Contact Person

Name	Email	Phone
Patrick Brown	patrick.brown@wku.edu	2707456247

Term of Implementation: 2024-2025

Program Reference Number: **728P**, 728

Review Type: Full Review

Academic Level: Undergraduate

Program Type: Major

Degree Types: Bachelor of Arts

Department: Mathematics

College: Science and Engineering

Program Name (eg. Biology): Mathematics, Bachelor of Arts

Will this program have concentrations? Yes

Concentrations

Concentrations

Teacher Education (TCHR)
 General (Non-Teacher Certifiable) (MATN)

CIP Code: 27.0101 - Mathematics, General.

Will this program lead to teacher certification? Yes

Does the proposed program contain 25% or more new content not previously taught in another course at WKU? If yes, contact the Office of the Provost for additional SACSCOC proposal requirements

No

Approval Path

1. 10/20/23 7:29 pm
Kanita DuCloux (kanita.ducloux):
Approved for MATH Approval
2. 10/30/23 9:08 am
Stuart Burris (stuart.burris):
Approved for SC Dean

History

1. May 25, 2021 by Rheanna Plemons (rheanna.plemons)
2. Sep 27, 2021 by Jennifer Hammonds (jennifer.hammonds)
3. Mar 7, 2022 by Jessica Dorris (jessica.dorris)
4. Jul 20, 2022 by Ryan Wilson (ryan.wilson)
5. Jun 8, 2023 by Patrick Brown (patrick.brown)

Catalog Content

Program Overview (Catalog field: Overview tab)

This major is intended for students that are pursuing a basic math major for employment purposes and/or are interested in mathematics as part of a degree with two majors. Students pursuing teacher certification will also major in [Science and Mathematics Education \(774\)](#).

Curriculum Requirements (Catalog field: Program Requirements)

~~Admission Requirements To be fully admitted to the majors in mathematics with reference numbers 728 or 528, students must complete the following admission requirements: Earn a "C" or better in each of the following courses: MATH 136, MATH 137, and MATH 307 (or MATH 310). Have an overall GPA of at least 2.4 in the mathematics program courses completed prior to admission (MATH 136, MATH 137, and MATH 307 (or MATH 310)). Note: If a course is repeated, then the second grade is used to compute the GPA. If a course is repeated multiple times, then the average of all grades after the first attempt is used to compute the GPA. Students can earn a grade in a course a maximum of three times.~~ Program Requirements (39 hours)

Approved Shared Content from /shared/undergraduate-major-requirements/

Last Approved: Jul 6, 2023 12:58pm

A baccalaureate degree requires a minimum of 120 unduplicated semester hours. More information can be found at www.wku.edu/registrar/degree_certification.php.

Students who began WKU in the Fall 2014 and thereafter should review the Colonnade requirements located at: <https://www.wku.edu/colonnade/colonnaderequirements.php>.

A major in mathematics provides a Bachelor of Arts degree and require a minimum of 39 semester hours for a general major with a minor or second major. Note: All mathematics courses listed as prerequisites for other mathematics courses must have been completed with a grade of "C" or better.

~~Students who wish to declare a 728 mathematics major will initially be designated as "seeking admission" until the following requirements have been satisfied: Complete MATH 136, MATH 137, and MATH 307 or MATH 310, with a grade of "C" or better in each course. Have an overall GPA of at least 2.4 in mathematics program courses (MATH 136 and above) completed prior to admission.~~ The general mathematics major (728) offers two options:

Teacher Certifiable Option (Secondary Mathematics Teacher Certification)

General (Non-teacher Certifiable) Option

Students in the general mathematics major (728) are required to satisfy a computational requirement as detailed within the options below.

Students must complete a minimum of 39 hours of mathematics with a minor or second major giving a total of at least 59 hours (53 unduplicated) with the following requirements.²

Core Mathematics Courses

All students in the general mathematics (728) major must complete the following core mathematics courses:

MATH 136	Calculus I	4
MATH 137	Calculus II	4
MATH 237	Multivariable Calculus	4
MATH 307	Introduction to Linear Algebra	3
MATH 310	Introduction to Discrete Mathematics	3
MATH 317	Introduction to Algebraic Systems	3
MATH 337	Elements of Real Analysis	3
MATH 498	Senior Seminar	3
Total Hours		27

Teacher Certifiable Option (TCHR)

Students in the Teacher Certifiable Option must complete a second major in Science and Mathematics Education (774).

In addition to the Core Mathematics Courses, students must complete 12 additional hours as follows:

Required Courses:³

MATH 304	Functions, Applications and Explorations	3
MATH 323	Geometry I	3
MATH 421	Problem Solving for Secondary Teachers	3
STAT 301	Introductory Probability and Applied Statistics	3
Total Hours		12

Students in the Teacher Certifiable Option must satisfy a computational requirement by completing either CS 170 or CS 180.

General (Non-Teacher Certifiable) Option (MATN)

Students in the Non-Teacher Certifiable Option must complete a minor or second major giving a total of at least 59 hours (53 unduplicated).

In addition to the Core Mathematics Courses, students must complete 12 additional hours as follows:

Select six (6) hours from the following:¹

MATH 405	Numerical Analysis I	6
MATH 406	Numerical Analysis II	
MATH 415	Algebra and Number Theory	
MATH 417	Algebraic Systems	

MATH 423	Geometry II
MATH 431	Intermediate Analysis I
MATH 435	Partial Differential Equations
MATH 439	Topology I
MATH 450	Complex Variables
MATH 470	Introduction to Operations Research
MATH 473	Introduction to Graph Theory
MATH 482	Probability and Statistics II
Select six (6) hours from the following: ¹	
MATH 305	Introduction to Mathematical Modeling
MATH 315	Theory of Numbers
MATH 323	Geometry I
MATH 331	Differential Equations
MATH 370	Applied Techniques in Mathematics
MATH 371	Advanced Computational Problem Solving
MATH 382	Probability and Statistics I
MATH 398	Seminar ((up to 3 hours))
MATH 405	Numerical Analysis I
MATH 406	Numerical Analysis II
MATH 415	Algebra and Number Theory
MATH 417	Algebraic Systems
MATH 423	Geometry II
MATH 435	Partial Differential Equations
MATH 439	Topology I
MATH 450	Complex Variables
MATH 470	Introduction to Operations Research
MATH 475	Selected Topics in Mathematics ((up to 3 hours))
MATH 482	Probability and Statistics II
STAT 301	Introductory Probability and Applied Statistics

6

Total Hours

12

Students in the General Option must satisfy a computational requirement by completing either CS 180, PHYS 316, PHYS 318 or STAT 330.

¹ Students may take certain 500-level mathematics courses for undergraduate credit with the approval of the Department Chair in place of courses listed in the elective sections of the General Option.

² Note: This major is not intended to prepare students adequately for graduate mathematics. Students intending to seek a graduate degree in mathematics should pursue major 528.

³ ~~Before the "professional semester," the student must complete MATH 136%7C, MATH 137%7C, and either MATH 307%7C or MATH 310%7C with a grade of "C" or better and achieve a GPA of at least 2.4 in all mathematics program courses.~~

4-Year Plan

Teacher Certifiable Option (TCHR)

First Year

Fall	Hours	Spring	Hours
MATH 136	4	MATH 137	4
SMED 101	3	SMED 102	3
CS 180 or CS 170	3-4	COMM 145	3
ENG 100	3	HIST 101 or HIST 102	3
Colonnade - Natural & Physical Sciences w/ lab	3-5	Colonnade - Social & Behavioral Science	3
	16-19		16

Second Year

Fall	Hours	Spring	Hours
MATH 307	3	MATH 310	3
MATH 237	4	MATH 304	3
SMED 310	3	SMED 320	3
ENG 200	3	Colonnade - Arts & Humanities	3
Colonnade - Natural & Physical Sciences w/ no lab3		World Language Requirement or General Elective	3

First Year			
Fall	Hours	Spring	Hours
	16		15
Third Year			
Fall	Hours	Spring	Hours
MATH 317	3	MATH 337	3
MATH 323	3	MATH 421	3
SMED 340	3	STAT 301	3
Colonnade - Writing in the Disciplines	3	SMED 360	3
Colonnade - Local to Global	3	Colonnade - Systems	3
	15		15
Fourth Year			
Fall	Hours	Spring	Hours
MATH 498	3	SMED 489	3
SMED 470	3	SEC 490	10
Colonnade - Social & Cultural	3		
General Elective	3		
General Elective	2-3		
	14-15		13
Total Hours 120-124			

General (Non-Teacher Certifiable) Option (MATN)

First Year			
Fall	Hours	Spring	Hours
MATH 136	4	MATH 137	4
Computational Requirement	3-4	General Elective	3
ENG 100	3	COMM 145	3
Colonnade - Natural & Physical Sciences w/ lab	3-5	HIST 101 or HIST 102	3
		Colonnade - Social & Behavioral Science	3
	13-16		16
Second Year			
Fall	Hours	Spring	Hours
MATH 307	3	MATH 310	3
MATH 237	4	Minor Elective	3
Minor Course	3	Colonnade - Social & Cultural	3
ENG 200	3	Colonnade - Arts & Humanities	3
Colonnade - Natural & Physical Sciences w/ no lab	3	World Language Requirement or General Elective	3
	16		15
Third Year			
Fall	Hours	Spring	Hours
MATH 317	3	MATH 337	3
Math upper-division Elective	3	Math upper-division Elective	3
Minor Course	3	Minor Course	3
Colonnade - Local to Global	3	Colonnade - Systems	3
Colonnade - Writing in the Disciplines	3	General Elective	3
	15		15
Fourth Year			
Fall	Hours	Spring	Hours
Math upper-division Elective	3	MATH 498	3
Minor Course	3	Math upper-division Elective	3
Minor Course or General Elective	3	Minor Course	3
General Elective	3	General Elective	3
General Elective	3	General Elective	3
	15		15
Total Hours 120-123			

Will this program be managed or owned by more than one department?

No

Does this program include courses from outside your department?

No

Please insert one Learning Outcome per box. Click green plus sign for additional LO boxes

Learning Outcomes and Measurement Plan

	List all student learning outcomes of the program.	Measurement Plan
SLO 1	Students will be prepared for employment in government, industry, or academic settings.	Employment prospects of seniors will be monitored in an exit survey.

	List all student learning outcomes of the program.	Measurement Plan
SLO 2	Students will be able to use technology and apply mathematics to solve problems effectively.	Technology usage will be monitored in an exit survey.
SLO 3	Students will have well-developed abilities to utilize critical thinking and communicate ideas effectively.	Completion of a capstone project in MATH 498.

Assessment Template: https://www.wku.edu/academicaffairs/ee/assurance_learning_resources.php

Upload Assessment Plan

Delivery Mode

Is 25% or more of this program offered at a location other than main campus?

No

Enter Location(s) and Percentage of Program Offered at Location(s)

Is 50% or more of this program offered by distance education (online asynchronous, online synchronous, connected classrooms, etc.)?

No

Do you plan to offer 100% of this program online?

No

If no, enter the percentage of the program that will be taught online.

0

Do you plan to offer 100% of this program face-to-face?

Yes

Do you plan to offer at least 25% of this program as a direct assessment competency-based educational program?

No

See the SACSCOC Policy on Direct Assessment Competency-based Educational Programs.

<https://www.sacscoc.org/pdf/081705/DirectAssessmentCompetencyBased.pdf>

Library Resources

Attach library resources

Rationale for the program proposal?

We want to do away with the admission requirements for the major, and erase the 728P designation. We view this distinction as an unnecessary hurdle for students and an unnecessary administrative burden for members of the faculty and staff.

Additional Attachments

Additional information or attachments

Reviewer Comments

Program Change Request

Date Submitted: 10/20/23 7:08 pm

Viewing: ~~730P~~, 730 : Middle Grades Mathematics, Bachelor of Science

Last approved: 04/12/23 3:42 pm

Last edit: 10/20/23 7:08 pm

Changes proposed by: ptr05178

Catalog Pages Using this Program

[Middle Grades Mathematics, Bachelor of Science \(730P, 730\)](#)

In Workflow

1. **MATH Approval**
2. **SC Dean**
3. **SC Curriculum Committee**
4. Professional Education Council
5. Undergraduate Curriculum Committee
6. University Senate
7. Provost
8. Program Inventory

Proposed Action	Active								
Contact Person	<table border="1"> <thead> <tr> <th>Name</th> <th>Email</th> <th>Phone</th> </tr> </thead> <tbody> <tr> <td>Patrick Brown</td> <td>patrick.brown@wku.edu</td> <td>270-745-6247</td> </tr> </tbody> </table>			Name	Email	Phone	Patrick Brown	patrick.brown@wku.edu	270-745-6247
Name	Email	Phone							
Patrick Brown	patrick.brown@wku.edu	270-745-6247							
Term of Implementation	2024-2025								
Program Reference Number	730P ; 730								
Review Type	Full Review								
Academic Level	Undergraduate								
Program Type	Major								
Degree Types	Bachelor of Science								
Department	Mathematics								
College	Science and Engineering								
Program Name (eg. Biology)	Middle Grades Mathematics, Bachelor of Science								
Will this program have concentrations?	No								
CIP Code	27.0101 - Mathematics, General.								
Will this program lead to teacher certification?	<u>Yes</u> No								
Does the proposed program contain 25% or more new content not previously taught in another course at WKU? If yes, contact the Office of the Provost for additional SACSCOC proposal requirements	<u>No</u>								

Approval Path

1. 10/20/23 7:34 pm
Kanita DuCloux (kanita.ducloux):
Approved for MATH Approval
2. 10/30/23 9:08 am
Stuart Burris (stuart.burris):
Approved for SC Dean

History

1. May 26, 2021 by Rheanna Plemons (rheanna.plemons)
2. Sep 27, 2021 by Jennifer Hammonds (jennifer.hammonds)
3. Jul 18, 2022 by Ryan Wilson (ryan.wilson)
4. Apr 12, 2023 by Jennifer Hammonds (jennifer.hammonds)

Catalog Content

Program Overview (Catalog field: Overview tab)

A major in middle grades mathematics is for students who plan to teach mathematics in grades 5-9 only. The degree requires a second major in Science and Mathematics education (reference number 774). Upon successful completion of both majors, the student will receive a Bachelor of Science degree.

Curriculum Requirements (Catalog field: Program Requirements)

~~Admission Requirements Students who wish to declare a 730 middle grades mathematics major will initially be designated as "seeking admission" until the following requirements have been satisfied: Complete 3 of the following with a "C" or better in each course: MATH 136 , MATH 183 , MATH 205 , MATH 206 ,~~

~~MATH 302. Have an overall GPA of at least 2.5 in all middle grades mathematics program courses (MATH 136 and above) completed prior to admission. Note: If a course is repeated, then the second grade is used to compute the GPA. If a course is repeated multiple times, then the average of all grades after the first attempt is used to compute the GPA.~~ Program Requirements (34 hours)

Approved Shared Content from /shared/undergraduate-major-requirements/
 Last Approved: Jul 6, 2023 12:58pm

A baccalaureate degree requires a minimum of 120 unduplicated semester hours. More information can be found at www.wku.edu/registrar/degree_certification.php. Students who began WKU in the Fall 2014 and thereafter should review the Colonnade requirements located at: <https://www.wku.edu/colonnade/colonnaderequirements.php>.

MATH 136	Calculus I	4
MATH 183	Introductory Statistics	3
or STAT 301	Introductory Probability and Applied Statistics	
MATH 205	Number Systems and Number Theory for Teachers	3
MATH 206	Fundamentals of Geometry for Teachers	3
MATH 302	Introduction to Advanced Mathematics for Middle Grades Teachers	3
or MATH 310	Introduction to Discrete Mathematics	
MATH 304	Functions, Applications and Explorations	3
MATH 308	Rational Numbers and Data Analysis for Teachers	3
MATH 403	Geometry for Elementary and Middle School Teachers	3
or MATH 323	Geometry I	
MATH 411	Problem Solving for Elementary and Middle School Teachers	3
or MATH 421	Problem Solving for Secondary Teachers	
MATH 413	Algebra and Technology for Middle Grades Teachers	3
MATH 490	Seminar in Middle Grades Mathematics	3
or MATH 498	Senior Seminar	
Total Hours		34

Students must attain a grade of "C" or better in each required course and must have a 2.5 GPA overall in required mathematics courses.

4-Year Plan

Finish in Four Plan

First Year

Fall	Hours	Spring	Hours
MATH 136	4	MATH 183	3
SMED 101	3	MATH 205	3
ENG 100	3	SMED 102	3
Colonnade: Natural & Physical Sciences	3	COMM 145	3
Colonnade: Arts & Humanities	3	Colonnade: Social & Behavioral	3
	16		15

Second Year

Fall	Hours	Spring	Hours
MATH 302	3	MATH 206	3
MATH 308	3	MATH 304	3
SMED 310	3	SMED 320	3
ENG 200	3	Colonnade: Natural & Physical Sciences with Lab3	
World Language, if needed OR General Elective	3	World Language, if needed OR General Elective	3
	15		15

Third Year

Fall	Hours	Spring	Hours
MATH 411	3	MATH 403	3
MATH 413	3	SMED 360	3
SMED 340	3	ENG 300	3
Colonnade: Connections (Social & Cultural)	3	Colonnade: Connections (Local to Global)	3
Elective	3	Elective	3

First Year			
Fall	Hours	Spring	Hours
	15		15
Fourth Year			
Fall	Hours	Spring	Hours
MATH 490	3	SMED 489	3
SMED 470	3	MGE 490	10
Colonnade: Connections (Systems)	3		
Elective	3		
Elective(s)	4		
	16		13
Total Hours	120		

Will this program be managed or owned by more than one department?

No

Does this program include courses from outside your department?

No

Please insert one Learning Outcome per box. Click green plus sign for additional LO boxes

Learning Outcomes and Measurement Plan

	List all student learning outcomes of the program.	Measurement Plan
SLO 1	<u>Effectively communicate mathematical ideas</u> Communicate mathematics effectively in verbal both written and written oral forms.	Students will be evaluated based on Rubric measurement of the application of mathematics in their final senior project in MATH 490, the senior capstone class, 490- <u>For this project, students must complete an in-depth mathematics project and communicate their results in a final paper and presentation.</u> <u>To be considered successful, students will need to score "sufficient" or better across all domains in the project rubric.</u>
SLO 2	<u>Successfully solve a variety of problems using appropriate mathematical tools.</u> Apply mathematics in solving real-world problems and demonstrate capacity to use multiple strategies and appropriate technology to apply mathematics in problem-solving situations.	Students will be evaluated based on their final exam in MATH 411, Problem Solving for Middle Grades Teachers. <u>This final exam requires students to solve problems from across mathematical content areas using a wide variety of problem solving techniques and mathematical tools.</u> <u>To be considered successful, students will need to average 7.5 or better on the 10-point problem solving rubric across all problems on the exam.</u> Rubric measurement of the application of mathematics in their senior project in MATH 490-
SLO 3	<u>Propose and rigorously prove mathematical conjectures.</u> Use mathematics as a tool for decision-making.	Students will be evaluated based on their performance on the proof-based problems on the final exam in MATH 403, Geometry for Middle Grades Teachers. <u>These problems require students to make conjectures and write rigorous formal mathematical proofs.</u> <u>To be considered successful, students will need to average 7.5 or better on the 10-point rubric on all proof-based problems.</u> Rubric measurement of the application of mathematics in their senior project in MATH 490-

Assessment Template: https://www.wku.edu/academicaffairs/ee/assurance_learning_resources.php

Upload Assessment Plan

Delivery Mode

Is 25% or more of this program offered at a location other than main campus?

Yes

Enter Location(s)
and Percentage of
Program Offered at
Location(s)

Location	Percentage
Elizabethtown	400
Glasgow	<u>26.5</u> 400
Owensboro	400
Somerset	400

Is 50% or more of this program offered by distance education (online asynchronous, online synchronous, connected classrooms, etc.)?

No

Do you plan to offer 100% of this program online?

No

If no, enter the percentage of the program that
will be taught online.

8.8 ~~50~~

Do you plan to offer 100% of this program face-to-face?

Yes

Do you plan to offer at least 25% of this program as a direct assessment competency-
based educational program?

No

See the SACSCOC Policy on Direct Assessment Competency-based Educational Programs.

<https://www.sacscoc.org/pdf/081705/DirectAssessmentCompetencyBased.pdf>

Library Resources

Attach library
resources

Rationale for the program proposal?

First, we want to do away with the admission requirements for the major, and erase the 730P designation. We view this distinction as an unnecessary hurdle for students and an unnecessary administrative burden for members of the faculty and staff.

Second, we are updating the Learning Outcomes to better match the priorities of the current program faculty. We believe these new Outcomes are more representative of our expectations for our Middle Grades Mathematics program graduates and future teachers.

Finally, we have updated some items in the delivery mode section to match our current reality. After the SKyTeach program terminated their program on the regional campuses, we stopped offering our Middle Grades Mathematics program courses at those campuses, as the two programs work in symbiosis. At the present time we do offer MATH 205, 206, and 308 (9/34 of our program) at the Glasgow Campus to serve the Elementary Education program there. On the other regional campuses, only MATH 308 is offered.

Additional
Attachments

Additional information or attachments

Reviewer Comments

Program Change Request

Date Submitted: 10/09/23 10:01 am

Viewing: **731 : Mathematical Economics, Bachelor of Science**

Last approved: 06/08/23 11:41 am

Last edit: 10/09/23 10:01 am

Changes proposed by: mln27164

Catalog Pages [Mathematical Economics, Bachelor of Science \(731\)](#)
 Using this Program

Proposed Action	Active		
Contact Person	Name	Email	Phone
	David Zimmer	david.zimmer@wku.edu	270-745-2880
	Melanie Autin	melanie.autin@wku.edu	270-745-6171
Term of Implementation	2024-2025		
Program Reference Number	731		
Review Type	Full Review		
Academic Level	Undergraduate		
Program Type	Major		
Degree Types	Bachelor of Science		
Department	Economics		
College	Business		
Program Name (eg. Biology)	Mathematical Economics, Bachelor of Science		
Will this program have concentrations?	Yes		
Concentrations			

- In Workflow**
1. **ECON Approval**
 2. **BU Dean**
 3. **BU Curriculum Committee**
 4. **MATH Approval**
 5. **SC Dean**
 6. **SC Curriculum Committee**
 7. Undergraduate Curriculum Committee
 8. University Senate
 9. Provost
 10. Program Inventory

- Approval Path**
1. 09/15/23 10:59 am
David Zimmer (david.zimmer): Approved for ECON Approval
 2. 09/15/23 11:28 am
Evelyn Thrasher (evelyn.thrasher): Approved for BU Dean
 3. 09/19/23 11:31 am
Alexander Lebedinsky (alex.lebedinsky): Rollback to Initiator
 4. 10/09/23 10:18 am
Alexander Lebedinsky (alex.lebedinsky): Approved for ECON Approval
 5. 10/09/23 10:19 am
Evelyn Thrasher (evelyn.thrasher): Approved for BU Dean
 6. 10/25/23 2:11 pm
Alexander Lebedinsky (alex.lebedinsky): Approved for BU Curriculum Committee
 7. 10/26/23 12:46 pm
Kanita DuCloux (kanita.ducloux): Approved for MATH Approval
 8. 10/30/23 9:09 am
Stuart Burris (stuart.burris): Approved for SC Dean

History

Concentrations

General Mathematical Economics (MEGM)

Actuarial Science (MEAS)

CIP Code 45.0603 - Econometrics and Quantitative
Economics.

Will this program lead to teacher certification? No

Does the proposed program contain 25% or more new content not previously taught in another course at WKU? If yes, contact the Office of the Provost for additional SACSCOC proposal requirements

1. May 13, 2021 by Rheanna Plemons (rheanna.plemons)
2. May 26, 2021 by Rheanna Plemons (rheanna.plemons)
3. Sep 27, 2021 by Jennifer Hammonds (jennifer.hammonds)
4. Feb 10, 2022 by Jessica Dorris (jessica.dorris)
5. Apr 22, 2022 by Jessica Dorris (jessica.dorris)
6. Jun 8, 2023 by Alexander Lebedinsky (alex.lebedinsky)

Catalog Content

Program Overview (Catalog field: Overview tab)

The BS in Mathematical Economics is for students wishing to pursue either a graduate degree in economics or a highly applied, analytical occupation with a heavy emphasis on quantitative skills such as an actuary. This degree does not require a second major or a minor. The BS in Mathematical Economics offers two concentrations: General concentration and Actuarial Science concentration.

International students who complete this program may qualify for the STEM OPT extension (the CIP Code of the program is 45.0603).

The General concentration in the BS in Mathematical Economics requires a minimum of 49 hours. This major is strongly recommended for students considering either a PhD in Economics or highly applied, analytical occupations, especially in data analytics. Because doctoral programs in economics are highly mathematical, this degree combines the economics coursework with the mathematics courses that are necessary to succeed in an economics doctoral program.

The Actuarial Science concentration in the BS in Mathematical Economics requires a minimum of 61 hours. This degree is strongly recommended for students pursuing careers as actuaries. Actuaries are professionals who specialize in modeling and managing risks. Actuaries typically work for health, life, and property insurance companies, but individuals with actuarial training may work in many other areas such as banking, investment, energy, government, employee benefits, predictive analytics, and many more. Actuaries use a combination of strong analytical skills, business knowledge, and an understanding of human behavior. It takes five to seven years on average to become an actuary after completing an undergraduate degree. To become an actuary, one must pass a series of exams to earn an actuarial designation by either the Casualty Actuarial Society (CAS) or the Society of Actuaries (SOA). Students in the Actuarial Science concentration will take courses that will help them prepare for the first two actuarial exams. As a part of becoming an actuary, candidates must also earn Validation by Educational Experience (VEE) credits, which demonstrate that as students they received academic training in certain required areas. The course work in this concentration is designed for students to receive all three of the VEE credits required by the SOA: Economics, Mathematical Statistics, and Accounting and Finance.

Curriculum Requirements (Catalog field: Program Requirements)

Program Requirements (50-65 hours)

Approved Shared Content from /shared/undergraduate-major-requirements/

Last Approved: Jul 6, 2023 12:58pm

A baccalaureate degree requires a minimum of 120 unduplicated semester hours. More information can be found at www.wku.edu/registrar/degree_certification.php.

Students who began WKU in the Fall 2014 and thereafter should review the Colonnade requirements located at: <https://www.wku.edu/colonnade/colonnaderequirements.php>.

The major in Mathematical Economics requires a total of 120 credit hours with a core of 18 hours in economics, 15 hours in mathematics, and 1 hour of an interdisciplinary seminar course. The concentration in general mathematical economics requires an additional 9 hours in economics, 6 hours in mathematics, and 1 hour in a career readiness course. The concentration in actuarial science requires an additional 3 hours in economics, 9 hours in mathematics, 12 hours in finance, 3-4 hours in computer science, and 3 hours in actuarial science.

The program of study does not require completion of a second major or minor.

Core Courses

ECON 202	Principles of Economics (Micro)	3
ECON 203	Principles of Economics (Macro)	3
ECON 206	Statistics	3
or STAT 301	Introductory Probability and Applied Statistics	
ECON 302	Microeconomic Theory	3
ECON 303	Macroeconomic Theory	3
Select one of the following:		3
ECON 465	Regression and Econometric Analysis	
ECON 480	Economic Forecasting	
STAT 401	Regression Analysis	
MATH 136	Calculus I	4

MATH 137	Calculus II	4
MATH 237	Multivariable Calculus	4
MATH 307	Introduction to Linear Algebra	3
MATH 306	Applied and Computational Linear Algebra ¹	<u>3</u>
or MATH 307	Introduction to Linear Algebra	
ECON 497	Senior Seminar in Mathematical Economics	1
Total Hours		34

1

[Students who plan to pursue a PhD in Economics should take MATH 307.](#)

Additionally, majors must choose a concentration in either General Mathematical Economics or Actuarial Science.

General Mathematical Economics Concentration

ECON 306	Statistical Analysis	3
or ECON 307	Financial Data Modeling	
ECON 464	Introduction to Mathematical Economics	3
Select 3 hours of 300- and 400-level economics electives		3
MATH 331	Differential Equations	3
or MATH 310	Introduction to Discrete Mathematics	
Select one of the following:		3
MATH 331	Differential Equations	
MATH 310	Introduction to Discrete Mathematics	
MATH 305	Introduction to Mathematical Modeling	
MATH 382	Probability and Statistics I	
MATH 435	Partial Differential Equations	
MATH 405	Numerical Analysis I	
ECON 399	Career Readiness in Economics	1
Total Hours		16

Actuarial Science Concentration

ECON 307	Financial Data Modeling	3
MATH 310	Introduction to Discrete Mathematics	3
MATH 382	Probability and Statistics I	3
MATH 482	Probability and Statistics II	3
ACTU 382	Course ACTU 382 Not Found	<u>3</u>
ACTU 482	Course ACTU 482 Not Found	<u>3</u>
FIN 330	Principles of Finance	3
FIN 332	Investment Theory	3
FIN 350	Risk Management and Insurance	3
FIN 437	Corporate Asset Management	3
CS 170	Problem Solving and Programming	3-4
or CS 180	Computer Science I	
or STAT 330	Introduction to Statistical Software	
ACTU 301	Financial Mathematics for Actuarial Science	3
Total Hours		30-31

4-Year Plan

Actuarial Science Concentration

First Year	Hours	Spring	Hours
Fall			
BA 170	1	COMM 145	3
ENG 100	3	MATH 137	4

First Year			
Fall	Hours	Spring	Hours
MATH 136	4	ECON 202	3
Colonnade - Arts & Humanities	3	HIST 101 or HIST 102	3
General University Elective	3	Colonnade - Natural & Physical Sciences w/ lab	3
	14		16
Second Year			
Fall	Hours	Spring	Hours
ECON 203	3	CS 170 , CS 180 , or STAT 330 (STAT 330 is recommended.)	3-4
ACCT 110 (Pre-requisite for FIN 330)	3	FIN 330	3
MATH 307	3	ECON 206 or STAT 301	3
MATH 306 or MATH 307 ¹	3	MATH 237	4
MATH 310	3	Colonnade - Natural & Physical Sciences	3
Colonnade - Literary Studies	3		
	15		16-17
Third Year			
Fall	Hours	Spring	Hours
ECON 302	3	ECON 303	3
ECON 307	3	FIN 332	3
MATH 382	3	FIN 350	3
ACTU 382	3	MATH 482	3
ACTU 301	3	ACTU 482	3
Colonnade - Connections Social & Cultural or Local to Global or Systems	3	Colonnade - Writing in the Disciplines	3
	15		15
Fourth Year			
Fall	Hours	Spring	Hours
ECON 465 , STAT 401 , or ECON 480 ²	3	ECON 497	1
FIN 437	3	Colonnade - Connections Social & Cultural or Local to Global or Systems	3
FIN 438 ³	3	General University Elective	3
Colonnade - Connections Social & Cultural or Local to Global or Systems	3	General University Elective	3
General University Elective	3	General University Upper-Division Elective	3
	15	General University Elective	1
			14

Total Hours 120-121

¹ Students who plan to pursue a PhD in Economics should take MATH 307.² It is recommended that ECON 465 should be taken during the second to last semester as it will help student prepare for the Senior Seminar. ECON 465 should not be taken concurrently with ECON 497³ [ECON 480](#) and [FIN 438](#) are not required for the degree. However, [FIN 438](#) can be used toward a VEE credit, and [ECON 480](#) will help students prepare for actuarial exams.

General Concentration

First Year			
Fall	Hours	Spring	Hours
BA 175	3	COMM 145	3
ECON 202	3	HIST 101 or HIST 102	3
ENG 100	3	MATH 137	4
MATH 136	4	Colonnade - Arts & Humanities	3
Colonnade - Natural Sciences w/ lab	3	Colonnade - Literary Studies	3
	16		16
Second Year			
Fall	Hours	Spring	Hours
MATH 307	3	CS 170 or CS 180	3-4
MATH 306 or MATH 307 ¹	3	ECON 206 or STAT 301	3
ECON 203	3	MATH 237	4
MATH 310 or MATH 331	3	Colonnade - Social & Cultural or Local to Global or Systems	3
Colonnade - Natural & Physical Sciences w/ no lab	3	General Elective	3
Colonnade - Connections Social & Cultural or Local to Global or Systems	3		
	15		16-17
Third Year			
Fall	Hours	Spring	Hours
ECON 302	3	ECON 303	3
ECON 306	3	ECON 465 , ECON 480 , or STAT 401	3
General upper-division Elective	3	Colonnade - Writing in the Disciplines	3
General Elective	3	Colonnade - Connections Social & Cultural or Local to Global or Systems	3

First Year			
Fall	Hours	Spring	Hours
MATH 305 , MATH 310 , or MATH 331	3	General Elective	3
	15		15
Fourth Year			
Fall	Hours	Spring	Hours
ECON 464	3	ECON 497	1
ECON 465 ²	3	General upper-division Elective	3
General upper-division Elective	3	General upper-division Elective	3
General upper-division Elective	3	General Elective	3
General Elective	3	General Elective	2
	15		12

Total Hours 120-121

¹ Students who plan to pursue a PhD in Economics should take MATH 307.

² It is recommended that ECON 465 should be taken during the second to last semester as it will help student prepare for the Senior Seminar. ECON 465 should not be taken concurrently with ECON 497.

Will this program be managed or owned by more than one department?

Yes

Interdisciplinary
Departments

Secondary Departments
Mathematics (MATH)

Does this program include courses from outside your department?

Yes

Outside Courses
Details

Who approved including these courses?	When were they approved?
The program uses a number of FIN courses, which was approved by the Finance department.	When the program was introduced in 2011

Please insert one Learning Outcome per box. Click green plus sign for additional LO boxes

Learning Outcomes
and Measurement
Plan

	List all student learning outcomes of the program.	Measurement Plan
SLO 1	Student Learning Outcome 1: Students will demonstrate their ability to apply mathematical models to study economic questions.	Instrument 1 Direct: Analysis of Capstone Project/Research Paper
SLO 2	Student Learning Outcome 2: Students will demonstrate ability to convey their research findings using oral communication.	Instrument 1 Direct: Capstone Project Poster Presentation
SLO 3	Student Learning Outcome 3: Students will demonstrate knowledge of key principles of microeconomics.	Instrument 1 Direct: Microeconomics Exam
SLO 4	Student Learning Outcome 4: Students will demonstrate knowledge of key principles of macroeconomics.	Instrument 1 Direct: Macroeconomics Exam

Assessment Template: https://www.wku.edu/academicaffairs/ee/assurance_learning_resources.php

Upload Assessment
Plan

Delivery Mode

Is 25% or more of this program offered at a location other than main campus?

No

Enter Location(s)
and Percentage of
Program Offered at
Location(s)

Is 50% or more of this program offered by distance education (online asynchronous, online synchronous, connected classrooms, etc.)?

No

Do you plan to offer 100% of this program online?

No

If no, enter the percentage of the program that will be taught online.

0

Do you plan to offer 100% of this program face-to-face?

Yes

Do you plan to offer at least 25% of this program as a direct assessment competency-based educational program?

No

See the SACSCOC Policy on Direct Assessment Competency-based Educational Programs.

<https://www.sacscoc.org/pdf/081705/DirectAssessmentCompetencyBased.pdf>

Library Resources

Attach library resources

Rationale for the program proposal?

We are adding MATH 306 Applied and Computational Linear Algebra as an OR class for the MATH 307 Introduction to Linear Algebra, which is currently included in the program. This option will allow students to take a more applied course in linear algebra as opposed to the more theoretical focus of MATH 307, and this will give students the type of skills they will need in the job market. Students who plan to pursue a PhD in Economics will be advised to take MATH 307.

We are changing the ECON/MATH 497 requirement to ECON 497 only. MATH 497 will be suspended. It has only been offered once as an independent study course.

To better market the Actuarial Science concentration of the major, we have created ACTU 382/482 courses that are equivalent to MATH 382/482 courses. This will allow prospective and current students to see that courses in this program prepare them for actuary exams and their future careers as actuaries.

Additional Attachments

Additional information or attachments

Revised by Registrar 4/22/22. ACCT 200 updated to ACCT 220 effective 202230.

Reviewer Comments **Alexander Lebedinsky (alex.lebedinsky) (09/19/23 11:31 am)**: Rollback: Rolling back so that additional changes can be made by the Math department

Course Change Request

New Course Proposal

Date Submitted: 10/20/23 9:45 am

Viewing: **PHYS 170 : Introduction to the Physics Major**

Last revision: 10/26/23 12:00 pm

Changes proposed by: mch78086

Proposed Action

In Workflow

1. **PHYA Approval**
2. **SC Dean**
3. **SC Curriculum Committee**
4. Undergraduate Curriculum Committee
5. University Senate
6. Provost
7. Course Inventory

Approval Path

1. 10/20/23 9:55 am
Michael Carini (mike.carini):
Approved for PHYA Approval
2. 10/30/23 9:10 am
Stuart Burris (stuart.burris):
Approved for SC Dean

Active

Contact(s)

Name	E-mail	Phone
Michael Carini	mike.carini@wku.edu	279-745-6198

Term for implementation Fall 2024

Academic Level Undergraduate

Course prefix (subject area) PHYS - Physics Course number 170

Department Physics & Astronomy

College Science and Engineering

Course title

Introduction to the Physics Major

Abbreviated course title INTRO TO THE PHYSICS MaJOR

Course description

This course is the first of a two semester sequences of courses designed to introduce students to what is involved in pursuing a Physics major at WKU and to aid them in their transition to college.

Credit hours 1

Repeatable

Yes

Number of repeats 2

For maximum credits 1

Default grade type Standard Letter Alternate grade type(s)
Pass/Fail

Is this course intended to span more than one term?

No

Schedule type

Seminar

CIP Code 40.0801 - 40.0801

Does this course have prerequisites

No

Corequisites

Equivalent Courses

Restrictions:

College restriction? No

Field of study
restriction/major? No

Classification
restriction? No

Departmental
Restrictions

Reason for
developing the
proposed course

It is well known that building a sense of community among a cohort of students improves performance and retention. FTFY Physics majors start at various entry points in the curriculum, depending on factors such as their Math placement upon admission to WKU. This course will bring them together as a cohort to meet each other, understated what it means to be a physics major and to succeed in college.

Is this related to
other courses at
WKU?

No

What departments/programs have been consulted concerning potential impact (e.g. to possible duplication or conflict, changed corequisite or prerequisite for equivalent courses, etc.)? Please provide names and dates for individuals consulted.

N/A

How many sections
of this course per
academic year will
be offered?

1

How many students
per section are
expected to enroll in
this proposed
course?

5-10

How many students
per academic year
are expected to
enroll?

5-10

How were these
projections
calculated? Explain
any supporting
evidence/data you
have for arriving at
these projections:

Typical incoming class of FTFY freshman Physics majors.

Is this course part of
a program that leads

No

to teacher
certificate?

Are you seeking No
Colonnade approval
for this course?

Student Learning
Outcomes

#	Student Learning Outcomes
1	Articulate an understanding of the keys to college success.
2	Display an understanding of the WKU physics curriculum and its feeder courses.
3	Examine how to use reference materials, to effectively use the textbook and what constitutes effective note taking.
4	Explore undergraduate research opportunities in Physics and Astronomy.
5	Explore the various ways to get involved in campus life.
6	Describe the role of their academic advisor in their academic journey.
7	Articulate an understanding of the post baccalaureate opportunities a BS in physics provides.

Content outline

#	Topic
1	Keys to college success.
2	The physics curriculum.
3	How to effectively use the textbook and learning styles.
4	Effective note taking.
5	How to get involved on campus.
6	Your academic advisor and registering for classes.
7	Undergraduate research opportunities in Physics and Astronomy.
8	What can you do with a Physics degree?
9	Coping with finals and end of the semester stress.

Student
expectations and
requirements

Tentative texts and
course materials
None

Special equipment,
materials, or library
resources needed

None

Additional
information

Supporting
documentation

Reviewer Comments

Key: 9714

Course Change Request

New Course Proposal

Date Submitted: 10/20/23 9:52 am

Viewing: **PHYS 171 : Exploring the Physics Major**

Last revision: 10/26/23 12:00 pm

Changes proposed by: mch78086

Proposed Action

In Workflow

1. PHYA Approval
2. SC Dean
3. SC Curriculum Committee
4. Undergraduate Curriculum Committee
5. University Senate
6. Provost
7. Course Inventory

Approval Path

1. 10/20/23 9:55 am
Michael Carini (mike.carini):
Approved for PHYA Approval
2. 10/30/23 9:10 am
Stuart Burris (stuart.burris):
Approved for SC Dean

Active

Contact(s)

Name	E-mail	Phone
Michael Carini	mike.carini@wku.edu	2707456198

Term for implementation Fall 2024

Academic Level Undergraduate

Course prefix (subject area) PHYS - Physics Course number 171

Department Physics & Astronomy

College Science and Engineering

Course title

Exploring the Physics Major

Abbreviated course title EXPLORING THE PHYSICS MAJOR

Course description

This course is the second of a two semester sequences of courses designed to introduce students to what is involved in pursuing a Physics major at WKU and to help aid them in their transition to college.

Credit hours 1

Repeatable

Yes

Number of repeats 2

For maximum credits 1

Default grade type Standard Letter Alternate grade type(s)

Is this course intended to span more than one term?

No

Schedule type

Seminar

CIP Code 400801 - Physics, General.

Does this course have prerequisites

Yes

Prerequisites

And/Or	(	Course/Test Code	Min Grade/Score	Academic Level	)	Concurrency?
		PHYS 170				

Corequisites

Equivalent Courses

Restrictions:

College restriction? No

Field of study restriction/major? No

Classification restriction? No

Departmental Restrictions

Reason for developing the proposed course

It is well known that building a sense of community among a cohort of students improves performance and retention. FTFY Physics majors start at various entry points in the curriculum, depending on factors such as their Math aptitude upon admission to WKU. This course will bring them together as a cohort to learn to work in a team environment and to learn how to relate experimental results to theories and concepts in a quantitative way.

Is this related to other courses at WKU?

No

What departments/programs have been consulted concerning potential impact (e.g. to possible duplication or conflict, changed corequisite or prerequisite for equivalent courses, etc.)? Please provide names and dates for individuals consulted.

N/A

How many sections of this course per academic year will be offered?

1

How many students per section are expected to enroll in this proposed course?

5-10

How many students per academic year are expected to enroll?

5-10

How were these projections calculated? Explain any supporting evidence/data you

have for arriving at
these projections:

Typical incoming class of FTFY freshman Physics majors.

Is this course part of a program that leads to teacher certificate? No

Are you seeking Colonnade approval for this course? No

Student Learning
Outcomes

#	Student Learning Outcomes
1	Describe how to develop and test mathematical models of physical systems.
2	Explain physical laws.
3	Prepare a compelling narrative on a principle of physical science and communicate it effectively to peers.

Content outline

#	Topic
1	Dimensional analysis
2	Fermi problems and scaling in physical problems.
3	Differences between scalar and vector quantities.
4	Forces and how they relate to motion.
5	Rolling bodies; principles of repeated experimental measurement: mean, standard deviation, and standard error, and when to use each.
6	Conservation laws
7	Response of gasses to changes in heat and pressure.
8	Bernoulli's principle and applications.
9	Waves
10	Reflection and refraction of light.
11	Electrical circuits
12	Crystal structure and principles of solid-state physics.

Student
expectations and
requirements

Tentative texts and
course materials

None

Special equipment,
materials, or library
resources needed

None

Additional
information

Supporting
documentation

Reviewer Comments

Key: 9747

Course Change Request

Date Submitted: 10/24/23 4:33 pm

Viewing: **PHYS ~~413 312~~ : Physics Teaching Seminar: Laboratories Laboratory Practice and Procedure**

Also listed as: **~~PHYS 312~~**

Formerly known as: **PHYS 312**

Last revision: 10/24/23 4:33 pm

Changes proposed by: tng17992

Catalog Pages
referencing this
course

PHYS 312:

[Department of Physics and Astronomy](#)

Proposed Action

Active

Contact(s)

Name	E-mail	Phone
Ting-Hui Lee	ting-hui.lee@wku.edu	270-745-6472

Review Type [Full Review](#)

Term for implementation Fall 2024

Academic Level Undergraduate

Course prefix (subject area) PHYS - Physics

Course number **413 312**

Department Physics & Astronomy

In Workflow

1. **PHYA Approval**
2. **SC Dean**
3. **SC Curriculum Committee**
4. Professional Education Council
5. Undergraduate Curriculum Committee
6. University Senate
7. Provost
8. Course Inventory

Approval Path

1. 10/24/23 4:48 pm
Michael Carini (mike.carini):
Approved for PHYA Approval
2. 10/30/23 9:10 am
Stuart Burris (stuart.burris):
Approved for SC Dean

College Science and Engineering

Course title

Physics Teaching Seminar: Laboratories ~~Laboratory Practice and Procedure~~Abbreviated course PHYSICS TEACHING SEMINAR: LABS ~~LAB~~
title PRACTICE/PROCEDURES

Course description

This course develops pedagogical content knowledge and skills for teaching introductory physics laboratory at any level, particularly 7-12 grade. Topics include laboratory pedagogical frameworks such as confirmation labs, guided discovery labs, open-ended labs, and skill-focused labs. The class will be taught in an interactive, hands-on format to allow students to build necessary skills to teach laboratories in traditional, informal, virtual, and computational environments. May be counted as a restricted elective for a physics major or minor that is obtaining teaching certification. ~~A course to assist prospective high school physics teachers in being able to plan, design, equip and teach a high school physics laboratory.~~

Credit hours 1

Repeatable

Yes

Number of repeats 2

For maximum credits 1

Default grade type Standard Letter Alternate grade type(s)

Is this course intended to span more than one term?

No

Schedule type

~~Lab~~Lecture/LabCIP Code 131329 ~~400804~~ - Physics Teacher Education.
~~Physics, General.~~

Does this course have prerequisites

Yes ~~No~~

Prerequisites

And/Or	(	Course/Test Code	Min Grade/Score	Academic Level	)	Concurrency?
		<u>PHYS 231</u>	<u>C</u>	<u>UG</u>		
<u>Or</u>		<u>PHYS 255</u>	<u>C</u>	<u>UG</u>		

Corequisites

Equivalent Courses

Restrictions:

College restriction? No

Field of study
restriction/major? NoClassification
restriction? NoDepartmental
RestrictionsReason for changing
the course

The Physics Department has created three 1-credit Physics Teaching Seminar courses, Phys 415, 416 and 417, that focus on developing pedagogical content knowledge for teaching physics. We propose to add one more Teaching Seminar course that focuses on teaching laboratories by revising the existing course PHYS 312. The course number change from a 300-level to 400-level will match the three newly created courses and reflect the vigor of how the course is taught.

Is this related to
other courses at
WKU?

No

What departments/programs have been consulted concerning potential impact (e.g. to possible duplication or conflict, changed corequisite or prerequisite for equivalent courses, etc.)? Please provide names and dates for individuals consulted.

SKyTeach Melissa Rudloff, September and October, 2023

SKyTeach Catherine Poteet, September and October, 2023

Is this course part of a program that leads to teacher certificate? Yes

Are you seeking Colonnade approval for this course? No

Student Learning
Outcomes

#	Student Learning Outcomes
<u>1</u>	<u>Demonstrate an understanding of the elements of a "good" physics laboratory experience, including emphasis on student learning outcomes, relevant hands-on measurement, quantitative analysis of data, and laboratory safety.</u>
<u>2</u>	<u>Demonstrate the capability to acquire and utilize resources to design and conduct undergraduate laboratory physics experiments, as part of a progressive semester-based curriculum.</u>
<u>3</u>	<u>Explain the strengths and weaknesses of confirmation labs, guided discovery labs, open-ended labs, and skill-focused labs.</u>
<u>4</u>	<u>Make use of traditional, informal, virtual, and computational environments to conduct and relate elements of a laboratory exercise.</u>
<u>5</u>	<u>Display the skills to operate, maintain, and (as necessary) repair laboratory equipment.</u>
<u>6</u>	<u>Demonstrate the ability to help students construct knowledge, analyze data, and communicate results through experiments.</u>

Content outline

#	Topic
<u>1</u>	<u>lab frameworks and environments</u>
<u>2</u>	<u>traditional confirmation lab</u>
<u>3</u>	<u>open-ended lab in formal/informal environment</u>
<u>4</u>	<u>skill-focused lab</u>
<u>5</u>	<u>guided discovery lab in informal/virtual environment</u>
<u>6</u>	<u>Lecture lab tutorials, iOLab devices, ISLE lab structure</u>
<u>7</u>	<u>Lab equipment maintenance, lab equipment on a limited budget</u>

Student expectations and requirements

Tentative texts and course materials

[American Association of Physics Teachers \(AAPT\) Recommendations for the Undergraduate Physics Laboratory Curriculum](#)

Special equipment, materials, or library resources needed

Additional
information

Supporting
documentation

[Phys413 example syllabus.pdf](#)

Reviewer Comments

Key: 7085

Course Change Request

New Course Proposal

Date Submitted: 10/18/23 2:59 pm

Viewing: **ME 492 : ME Internship Project**

Last revision: 10/18/23 2:58 pm

Changes proposed by: kvn81606

Proposed Action

In Workflow

1. **EAS Approval**
2. **SC Dean**
3. **SC Curriculum Committee**
4. Undergraduate Curriculum Committee
5. University Senate
6. Provost
7. Course Inventory

Approval Path

1. 10/24/23 3:19 pm
Shahnaz Aly
(shahnaz.aly):
Approved for EAS Approval
2. 10/30/23 9:10 am
Stuart Burris
(stuart.burris):
Approved for SC Dean

Active

Contact(s)

Name	E-mail	Phone
Kevin Schmaltz	kevin.schmaltz@wku.edu	270 745-8859

Term for implementation Fall 2024

Academic Level Undergraduate

Course prefix (subject area) ME - Mechanical Engineering Course number 492

Department Engineering & Applied Sciences, School of

College Science and Engineering

Course title

ME Internship Project

Abbreviated course title ME INTERNSHIP PROJECT

Course description

This independent project class will be used to propose and complete the project scope, project execution schedule, and budget/resources needed to execute an internship project that will replace the traditional ENGR491 senior experience.

The student will work with an ME faculty member and their company sponsor for the project to develop the project deliverables, approve the document, and confirm support for the project.

Credit hours 1

Repeatable

No

Default grade type Pass/Fail Alternate grade type(s)

Is this course intended to span more than one term?

No

Schedule type

Practicum

CIP Code 141901 - Mechanical Engineering.

Does this course have prerequisites

No

Corequisites

Equivalent Courses

Restrictions:

College restriction? Yes

Select:

Include

College:

College
Science and Engineering

Field of study restriction/major? Yes

Select:

Include

Major:

Field of stud/major restriction
543 - Mechanical Engineering

Classification restriction? No

Departmental Restrictions

Reason for developing the proposed course

The ME faculty are creating an option to replace the traditional team-based ENGR490-491 capstone sequence with a traditional ENGR490 semester followed by an individual internship-based ENGR491 project. This option will be evaluated on a student-by-student basis subject to approval by the ME faculty.

The proposed course will provide a formal and documented mechanism for managing this capstone sequence option.

Is this related to other courses at WKU?

No

What departments/programs have been consulted concerning potential impact (e.g. to possible duplication or conflict, changed corequisite or prerequisite for equivalent courses, etc.)? Please provide names and dates for individuals consulted.

None. Only ME students may take this course.

How many sections of this course per academic year will be offered?

2

How many students per section are expected to enroll in this proposed course?

2

How many students per academic year are expected to enroll?

4

How were these projections calculated? Explain any supporting evidence/data you have for arriving at these projections:

This capstone option has been offered to ME seniors for two semesters in an informal basis, and 5 students have participated in this Internship project option during the past two semesters.

Is this course part of a program that leads to teacher certificate? No

Are you seeking Colonnade approval for this course? No

Student Learning Outcomes

#	Student Learning Outcomes
1	Demonstrate Engineering Design skills including definition of business and technical problems
2	Demonstrate Professional Skills including the creation and use of design documentation and project timelines

Content outline

#	Topic
1	Complete a project scope proposal including project execution schedule, and budget/resources needed to complete the project
2	Work with WKU ME faculty to develop approved deliverables that will satisfy ENGR491 requirements
3	Work with the company sponsor for the project to develop acceptable company deliverables, seek final approval of the proposal document, and confirm support for the project

Student expectations and requirements

Tentative texts and course materials
None

Special equipment,
materials, or library
resources needed

None

Additional
information

Supporting
documentation

Reviewer Comments

Key: 9752