

HOOOSIER

STEM

SCIENCE
TECHNOLOGY
ENGINEERING
MATHEMATICS

ACADEMY



Course Catalogue Ball State University Fall 2023



BALL STATE
UNIVERSITY

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About the Hoosier STEM Academy

The Hoosier STEM Academy is a partnership among Ball State University, IUPUI, and Purdue University to provide graduate-level STEM courses for current Indiana STEM teachers who wish to be credentialed to teach dual credit courses. Courses are designed specifically to meet the needs of Indiana high school teachers, including courses that use online, blended, and/or distance education instructional designs, as well as traditional face-to-face options. STEM teachers who wish to participate must currently teach in underserved Indiana school corporations and Indiana schools experiencing a shortage of qualified STEM teachers. Participants will also be invited to participate in the Hoosier STEM Academy Mentoring Conference. Upon completion of a course with a grade of C or higher, participants will receive a \$1,375 stipend to help cover the cost of tuition, fees, and/or materials.

The Hoosier STEM Academy is now launching the Fall 2020 course catalog. Instructions for how to apply and register for courses at each of the partner institutions follow the list of offerings. Be sure to read carefully as each campus may have slightly different procedures at this time. Participants may take up to two courses per semester, but may only take a total of 15 hours over the four program semesters. Because graduate courses are challenging, it is suggested that participants take only one course per semester during the academic year.

Note: Any participant who registers for a course through the Hoosier STEM Academy is responsible for checking with their dual credit provider institution that the course will count toward the dual credit credentials.

Application Process

Before You Apply

Students who wish to enroll in one or more courses as a Non-degree Seeking Graduate Student must meet the following admission criteria:

1. Hold an earned bachelor's degree from a college or university that is accredited by its regional accrediting association.
2. Satisfy one of the following:
 - a. An undergraduate cumulative grade point average (GPA) of at least 2.75 on a 4.0 scale (all undergraduate coursework, including work completed prior to the baccalaureate degree, is used to calculate the GPA).
 - b. A cumulative GPA of at least 3.0 on a 4.0 scale in the latter half of the baccalaureate. *

Step 1: Complete the Application

1. Find information about applying at:
<http://cms.bsu.edu/academics/collegesanddepartments/gradschool/admissions/application-process>
2. Read the information, and then click the "apply now" box. (or go to:
<https://www.applyweb.com/bsug/index.ftl>)
 - a. When completing the application, apply as a "non-degree seeking student"
 - b. When prompted, choose the "fee waiver" option at the end of the application process and select the "Con Selmer" fee waiver
 - c. Add the following in the comments field: "Applying as part of the consortium teacher's grant for dual-credit licensure; please waive my application fee."
3. Follow the instructions for submitting your transcripts
4. Ask your school principal to send a letter-confirming that your school is considered underserved and/or is experiencing a shortage of STEM teachers; send letters via email to: Dr. Jill Bradley-Levine, jsbradleylev@bsu.edu
5. In order for applications to be processed and students to register for courses on time. The Graduate School must receive all of your application materials in a timely manner.

Step 2: Register for Course(s)

1. Find information about registering for classes at:
<http://cms.bsu.edu/academics/advising/scheduling/course-registration>
2. Use the username and password you were sent by the Graduate School to log into my.bsu.edu (Graduate Students taking online or on-campus classes will receive a username and password (credentials) from the Graduate School within 4-7 days after acceptance. This will be sent to the email address you provided on the graduate application.)
3. Follow steps on the website above to search for and register for a course.
4. Upon registration, students will receive access to their student account and Blackboard online course portal.

* Nondegree students who later apply to a degree program must meet all entrance requirements of that program and must have maintained at least a 3.0 GPA in their nondegree coursework. No more than 9 hours earned in nondegree status may be applied to an advanced degree program if the person is later admitted as a degree-seeking student. The department in which the student is studying and the dean of the Graduate School will determine which credit hours earned in nondegree status will apply to a degree program. Credit hours must have been completed within the six-year time limit allowed for completion of a master's degree.

Tuition and Fees

- Tuition and the technology fee for a 3-hour **online course** will be \$1,316 (\$402/credit hour + \$110 technology fee; students taking more than 7 credit hours pay \$168 technology fee)
- Tuition and the technology fee for a 3-hour **on-campus course** will be \$1,783 (\$402/credit hour + \$110 technology fee, \$277 student services fee, \$53 recreation fee, and \$45 transportation fee)
- Lists of required textbooks are available through the Ball State Bookstore; you may purchase or rent texts through the Bookstore: <http://bsu.bncollege.com/> or through other online book sites.
- **Upon completion of a course with a grade of C or better, the Hoosier STEM Academy will send a stipend of \$1,375 to each participant.**
- Also upon completion of a course, students may obtain an official transcript with the course and grade. Official electronic transcripts are \$12; instructions are available here: <http://cms.bsu.edu/about/administrativeoffices/registrar/transcripts/>

Questions

Please contact Kizmin M. Jones with questions: kmjones4@bsu.edu

Ball State University Courses

Biology

CRN	SUBJECT	COURSE	SECTION	CAMPUS	CREDITS	TITLE	DA YS	TIME	ATTRIBUTE
34929	BIO	628	1	Main	3	Readings in Biology	TBA	TBA	
34889	BIO	628	2	Main	3	Readings in Biology	TB A	TBA	
34666	BIO	628	3	Main	3	Readings in Biology	TB A	TBA	
12054	BIO	629	1	Main	1	Seminar in Biology	F	4:00 p.m. – 4:50 p.m.	
30397	BIO	629	3	Main	1	Seminar in Biology N Amer Fish	TB A	TBA	
34828	BIO	697	1	Main	3	Research in Biology	TB A	TBA	
34928	BIO	697	2	Main	3	Research in Biology	TB A	TBA	

BIO 628- Readings in Biology

Directed readings for majors in biology. Individualized program of readings developed under the supervision of a faculty member. Prerequisite: permission of the department chairperson. A total of 6 credits may be earned.

1.000 TO 6.000 Credit hours

BIO 629 Seminar in Biology

Review and discussion of the literature related to selected topics of current interest in biological research. Prerequisite: permission of the department chairperson. A total of 2 credits may be earned toward a Master's degree and a total of 10 credits may be earned toward a doctoral degree, but no more than 1 in any one semester or term.

1.000 TO 10.000 Credit hours

BIO 697 Research in Biology

Independent research for biology majors at the master's or doctoral level. Students' research projects must be developed in consultation with a faculty member. As many as 6 credits may be applied toward a master's degree. As many as 12 credits may be applied to a doctoral degree. No more than 3 credits may be taken in one semester. Prerequisite: permission of the department chairperson. A total of 6 credits may be earned for the master's and 12 credits for the PhD, but not more than 3 in any one semester or term.

1.000 TO 3.000 Credit hours

Chemistry

CRN	SUBJECT	COURSE	SECTION	CAMPUS	CREDITS	TITLE	DAYS	TIME	ATTRIBUTE
11860	CHEM	500	1	Main	1	Chemical Communications	T	4:00p.m.-4:50 p.m.	
22200	CHEM	636	1	Main	3	Advanced Organic Chemistry	TBA	TBA	Special Permission Required

CHEM 500- Chemical Communications

Use of scientific literature, sources, and classification systems, and current and retrospective searches in the specialized branches of chemistry.

Prerequisite: 20 credits of chemistry or permission of the department chairperson. Not open to students who have credit in CHEM 400.

1.000 Credit hours

CHEM 638- Advanced Topics in Chemistry

Topics include nomenclature, bonding, acids and bases, stereochemistry, structure-reactivity relationships, and mechanisms of important reactions. Introduction to synthesis, the disconnect approach, synthons, protecting groups, and functional group interconversions. Prerequisite: CHEM 232 or 235 or equivalent.

3.000 Credit hours

Computer Sciences

CRN	SUBJECT	COURSE	SECTION	CAMPUS	CREDITS	TITLE	DAYS	TIME	Attribute
24460	CS	617	800	Main	3	Independent Study	ARR	OL	

CS 617- Independent Study

Introduction to programming in a contemporary, mainstream, high-level programming language such as Python. Use of numeric and textual data. Use of data structures such as arrays, lists, sets, and dictionaries/maps such as those implemented by hash tables. Students are expected to be comfortable with algebraic notation as expressed in high school mathematics.

3.000 Credit hours

Mathematics

CRN	SUBJECT	COURSE	SECTION	CAMPUS	CREDITS	TITLE	DAYS	TIME	Attribute
10423	MATH	511	1	Main	3	Abstract Algebra 1	TR	6:30 p.m.-7:45 p.m.	
21252	MATH	511	880	OL	3	Abstract Algebra 1	OL	6:30 p.m. – 7:45 p.m.	
25259	MATH	560	800	Main	3	History of Mathematics	MW	5:00 p.m. – 8:15 p.m.	
10583	MATH	560	1	Main	3	History of Mathematics	OL	5:00 p.m. – 8:15 p.m.	

30333	MATH	614	800	OL	3	Algebraic Reasoning	OL	OL	
32329	MATH	614	802	OL	3	Algebraic Reasoning	OL	OL	
30334	MATH	615	800	OL	3	Number Concepts and Number Theory	OL	OL	
30701	MATH	615	801	OL	3	Number Concepts and Number Theory	OL	OL	
10588	MATH	620	1	Main	4	Probability and Random Variables	MW	4:00 p.m.-5:40 p.m.	
30457	MATH	620	800	OL	4	Probability and Random Variables	OL	OL	
30457	MATH	624	801	OL	3	Introduction to Statistical Learning	OL	OL	
28057	MATH	680	800	OL	3	Special Studies in the Teaching of Mathematics	OL	OL	Special Permission Required and TK20 Teacher Education Course and Variable Title Course Offering
35787	MATH	680	801	OL	3	Special Studies in the Teaching of Mathem	OL	OL	Special Permission Required and TK20 Teacher Education Course and Variable Title Course Offering

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19238	MATH	694	800	OL	3	Research Methods in Mathematics Education	OL	OL	Special Permission Required
29330	MATH	694	801	OL	3	Research Methods in Mathematics Education	OL	OL	Special Permission Required
33252	MATH	694	802	OL	3	Research Methods in Mathematics Education	OL	OL	Special Permission Required

MATH 511- Abstract Algebra I

The theory of groups, including subgroups, cyclic groups, normal subgroups, cosets, Lagrange's Theorem, quotient structures, homomorphism, automorphisms, group actions, Sylow's Theorems, structure of finite abelian groups, generators, and relations. Prerequisite recommended: MATH 311.

Not open to students who have credit in MATH 411.

3.000 Credit hours

MATH 560- History of Mathematics

The development of mathematics from pre-history to the seventeenth century. Topics may include number concepts and numeration, algebra, geometry, trigonometry, analytic geometry, and calculus. Prerequisite recommended: MATH 161 or 165. Not open to students who have credit in MATH 460.

3.000 Credit hours

MATH 614- Algebraic Reasoning

Algebra as the study of patterns, as a symbolic language, as a tool for problem solving, as the study of functions, as generalized arithmetic, and as a way of modeling physical situations. Prerequisite: at least one year of teaching experience or permission of the department chairperson.

3.000 Credit hours

MATH 615- Number Concepts and Number Theory

Number development, number systems, properties and characteristics of classes of numbers, number sense, number theory, operations and their relationships, and algorithms. Prerequisite: at least one year of teaching experience or permission of the department chairperson.

3.000 Credit hours

MATH 620- Probability and Random Variables

Probability set functions, random variables, density and distribution functions, mathematical expectations, marginal and conditional distributions, sampling distributions, and limiting distributions. The mathematical rigor requires a strong background in calculus. Prerequisite recommended: MATH 166 and 215.

4.000 Credit hours

MATH 624- Probability and Random Variables

Supervised learning: classification, linear discriminant analysis, quadratic discriminant analysis, multiple discriminant analysis, model selection regularization, bootstrap methods. Unsupervised learning: principal component analysis, canonical correlation, clustering methods.

Prerequisite: MATH620 or permission of the department chairperson.

3.000 Credit hours

MATH 680- Special Studies in the Teaching of Mathematics

The student will work under the direction of a staff member in the Department of Mathematical Sciences. Assigned reading and reports; possible class attendance in related courses. Prerequisite: permission of the department chairperson. A total of 6 credits may be earned.

1.000 TO 6.000 Credit hours

MATH 690- Curriculum and Instruction in Mathematics Education

Focuses on the mathematics curriculum, with emphasis on current issues and trends, on teaching strategies, and standards-based teaching. Looking

at mathematics curriculum from a K-12 perspective, students will work on understanding these recommendations in light of previous mathematics curriculum experiences. Prerequisite: at least one year of teaching experience or permission of the department chairperson.
3.000 Credit hours

MATH 694- Research Methods in Mathematics Education

Research analysis and methodology in mathematics education. Prerequisite: at least one year of teaching experience, and 18 graduate credits in mathematics or mathematics education, including MATH 690, or permission of the department chairperson.
3.000 Credit hours

Physics

CRN	SUBJECT	COURSE	SECTION	CAMPUS	CREDITS	TITLE	DAYS	TIME	ATTRIBUTE
11394	PHYC	683	1	Main	1	Seminar in Physics	R	3:30 p.m.-4:45 p.m.	Variable Title Course Offering
33910	PHYC	685	1	Main	3	Special Studies in Physics	TBA	TBA	Special Permission Required and Variable Title Course Offering

PHYC 683- Seminar in Physics

Critical examination and discussion of recent experimental and theoretical developments in physics. Participation in and contribution of a presentation at departmental physics colloquia are expected. A total of 4 credits may be earned.
1.000 TO 4.000 Credit hours

PHYC 685- Special Topics in Physics: Video Analysis Investigations of Force and Motion

Special activities in physics involving one or more of the following: experimental work, study of advanced topics in physics, and attendance in prescribed classes. Prerequisite: permission of the department chairperson. A total of 8 credits may be earned.
1.000 TO 8.000 Credit hours