

HOOOSIER

STEM

SCIENCE
TECHNOLOGY
ENGINEERING
MATHEMATICS

ACADEMY



Course Catalogue Purdue Summer 2021



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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. Upon completion of a 3 credit course with a grade of C or higher, participants will receive a \$1,400 stipend to help cover the cost of tuition, fees, and/or materials.

The Hoosier STEM Academy is now launching the Summer 2021 course catalogue. 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 18 hours in a content area 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 will count toward the dual credit credentials.

Application Process

1. For those wanting to complete a course or courses at the **post-baccalaureate, non-degree status:**

A. Complete the Graduate School online admission application [here](#).

B. There is no application fee for non-degree applicants.

C. Upload evidence of a baccalaureate degree. This may be a transcript, a copy of the diploma, or a letter from the college or university verifying the degree.

D. Once you are admitted by the Graduate School and view your admission letter, you will be sent instructions by email for setting up your [myPurdue account](#) in order to register for classes.

For those wanting to complete for a **graduate degree:**

A. Complete the Graduate School online admission application [here](#). View Degrees and Programs [here](#). Choose up to 3 graduate majors in priority order.

Program application deadlines vary, so be sure to check with your program of interest to determine its deadline. For specific program deadlines, click [here](#).

B. Pay the \$60.00 nonrefundable application fee. Visa, Mastercard, Discover, and American cards are accepted.

C. Required application documents:

- i. Although the Graduate Record Examination (GRE) is not a Graduate School requirement, many graduate programs require this test. Check your program to see if they require GRE test scores [here](#).
- ii. Official transcripts for every institution of higher education attended
- iii. Statement of purpose
- iv. Three letters of recommendation

D. Once you are admitted officially by the Graduate School and view your online admission decision letter, you will be sent instructions by email for setting up your [myPurdue account](#) in order to register for classes. Your registration PIN is 999999 for any session. Complete a

For those who have already been admitted into the College of Education **as a post-baccalaureate, non-degree graduate student and have taken a course or courses within the past three sessions**, do not submit another application:

- A. Access your [myPurdue account](#) to register for classes. Your registration PIN is 999999.
- B. Please note up to twelve hours taken at this status may be considered for an advanced degree (subject to approval by your major professor, committee, department, and university).

Questions

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

Purdue University Courses

Biochemistry

CRN	SUBJECT	COURSE	SECTION	CAMPUS	CREDITS	TITLE	DAYS	TIME	ATTRIBUTE
27331	BCHM	30700	Y01	West Lafayette	3	Biochemistry	TBA	TBA	Upper Division June 14 – Aug 03 Distance Learning
24183	BCHM	56100	001	West Lafayette	3	General Biochemistry I	MWF	3:30 p.m.- 5:20 p.m.	Upper Division June 14-Aug 03 2020 Lecture

BCHM 30700 – Biochemistry

Credit Hours: 3.00. Students will have an understanding of the following content areas: structure/function of amino acids, carbohydrates, lipids and nucleic acids; protein structure, function and purification; basic enzymology; replication, transcription and translation; intermediary metabolism including glycolysis, the citric acid cycle, oxidative phosphorylation, photosynthesis. Students will also develop an appreciation for some of the contributions that have been made by biochemistry to society, including improvements to medicine, agriculture, and the economy. Typically offered Fall Spring Summer.

3.000 Credit hours

BCHM 56100- General Biochemistry I

Credit Hours: 3.00. This course provides upper-division undergraduate and graduate students with basic understanding of biochemical and structural properties of amino acids, nucleic acids, lipids, and carbohydrates. This course allows students to connect the relationship between structure and function of biomolecules. In addition, students learn to understand enzyme properties, enzyme mechanism of action, and enzyme regulation. Typically offered Fall.

3.000 Credit hours

Computer Sciences

CRN	SUBJECT	COURSE	SECTION	CAMPUS	CREDITS	TITLE	DAYS	TIME	ATTRIBUTE
10341	CS	50010	Y01	West Lafayette	3	Foundational Principles of Information Security	TBA	TBA	June 14- August 03 Asynchronous Online Distance Learning
13594	CS	50011	Y01	West Lafayette	3	Introduction to Systems for Information Security	TBA	TBA	June 14- August 03 Asynchronous Online Distance Learning
28815	CS	50023	DE1	West Lafayette	1	Data Engineering 1	TBA	TBA	June 01- July 04 Asynchronous Online Distance Learning
28816	CS	50024	DE2	West Lafayette	1	Data Engineering II	TBA	TBA	July 06- August 06 Asynchronous Online Distance Learning
28817	CS	50025	FDM	West Lafayette	1	Foundations of Decision Making	TBA	TBA	July 06- August 06 Asynchronous Online Distance Learning
13774	CS	59000	FCS	West Lafayette	1	Foundations of CS	TBA	TBA	June 01- July 04 Asynchronous Online Distance Learning
13782	CS	59000	NCD	West Lafayette	1	Numerical Computer for Data Science	TBA	TBA	July 06 – August 06 Asynchronous Online Distance Learning

CS 50010- Foundational Principles of Information Security

Credit Hours: 3.00. This course covers foundational principles relevant to information security including data structures, algorithm design, computational complexity, probability theory, number theory, and basics of cryptography. This course is restricted to CS graduate students. This course is required for students in the Master of Science in Computer Science Concentration in Information Security for Professionals Program. The course may not be used on the Plan of Study for any CS graduate students other than those in the Concentration in Information Security for Professionals program. Programming experience and computer science knowledge equivalent to that of a minor in CS. Incoming students are expected to have programming skills in at least one procedural programming languages, e.g., C,C++,Java, or Python. Typically offered Summer.
3.000 Credit hours

CS 50011- Introduction to Systems for Information Security

Credit Hours: 3.00. The course covers computer systems principles relevant to information security and it serves as a prerequisite for the later courses in the MS in IS program. The material includes features in the C/C++ programming languages for understanding security-critical software vulnerabilities, basic knowledge in computer architecture and assembly languages, knowledge of the compiling process, operating systems, networking, databases, and web applications relevant to information security. This course is restricted to CS graduate students. This course is required for students in the Master of Science in Computer Science Concentration in Information Security for Professionals Program. The course may not be used on the Plan of Study for any CS graduate students other than those in the Concentration in Information Security for Professionals program. Programming experience and computer science knowledge equivalent to that of a minor in CS. Incoming students are expected to have programming skills in at least one procedural programming languages, e.g., C,C++,Java, or Python. Typically offered Fall Summer.
0.000 OR 3.000 Credit hours

CS 50023- Data Engineering I

Credit Hours: 1.00. The course introduces students to the fundamentals of Data Engineering with a focus on tools and computational techniques to gather, construct, manipulate, summarize, and visualize data sets as a means to extract knowledge from the underlying data. Python and Python libraries are used. Completion of the course will allow learners to perform basic data analysis on data sets. Experience in Python Programming and Linear Algebra is required. The course also prepares learners for additional instruction in the courses Data Engineering II

and Foundations of Decision Making. Typically offered Fall Spring Summer.
1.000 Credit hours

CS 50024 - Data Engineering II

Credit Hours: 1.00. This course introduces students to the fundamentals of database management systems (DBMS) from a user's perspective. The principles of modeling an enterprise using Entity-Relationship diagrams and transforming the model into a relational or NoSQL database are illustrated through a range of examples. The SQL language is used to create, query, aggregate, and update a relational database. NOSQL databases and the related data models (column, graph, and document-based) are introduced. Experience in Python Programming is required. Typically offered Fall Spring Summer.
1.000 Credit hours

CS 50025 – Foundations of Decision Making

Credit Hours: 1.00. This course provides an overview of data science methods used for data-driven discovery, extraction of knowledge, and informed decision making. The course covers fundamental computational methods and statistical techniques used to correctly reason about uncertainty, conduct hypothesis tests, infer causal relationships, and apply and evaluate predictive models. The course highlights how sampling biases can impact fairness in decision making. Throughout, students get hands-on experience on how to make correct and explainable inferences from data. Experience in Python Programming, Probability, Statistics and Linear Algebra is required. Typically offered Fall Spring Summer.
1.000 Credit hours

CS 59000 – Foundations of CS

Credit Hours: 1.00 to 5.00. Directed study for students who wish to undertake individual reading and study on approved topics. Permission of instructor required. Typically offered Fall Spring.
0.000 TO 5.000 Credit hours

Earth, Atmospheric, and Planetary Sciences

CRN	SUBJECT	COURSE	SECTION	CAMPUS	CREDITS	TITLE	DAYS	TIME	ATTRIBUTE
29212	EAPS	32700	001	West Lafayette	3	Climate, Science, and Society	TBA	TBA	Upper Division June 14 – Aug 03 Asynchronous Online Distance Learning
29223	EAPS	36000	001	West Lafayette	3	Great Issues in Science and Society	TBA	TBA	Upper Division May 17 – July 11 Asynchronous Online

									Distance Learning
29228	EAPS	37500	002	West Lafayette	3	Great Issues – Fossil Fuels, Energy and Society	TBA	TBA	Upper Division Jun 14 – Aug 03 Asynchronous Online Distance Learning
29230e	EAPS	37500	003	West Lafayette	3	Great Issues – Fossil Fuels, Energy and Society	TBA	TBA	Upper Division May 17 – Jun 13 Asynchronous Online Distance Learning

EAPS 32700 – Climate, Science and Society

Credit Hours: 3.00. This course will examine the broad problems of climate change by examining the relationship between science, politics, and society by using climate change as a lens through which to examine larger issues. Students will be encouraged to identify similar themes in their own experiences as emerging scientists, engineers and global leaders. Adequate preparation to write essays and perform basic arithmetic calculations needed. Prior knowledge of climate change science is not necessary. Typically offered Fall Spring.

3.000 Credit hours

EAPS 36000 – Great Issues in Science and Society

Credit Hours: 3.00. This course develops basic skills and knowledge critical to analyze issues of energy use, climate change, and sustainability that incorporate both societal and scientific perspectives. The goal of this course is not to arrive at particular consensus solutions to the problems associated with these issues but instead to foster an informed (through information literacy) debate that will ultimately be waged as solutions are sought. Working in teams the students work throughout the semester to complete a capstone teamwork project and a group presentation. Counts for Great Issues course in College of Science. Typically offered Fall.

3.000 Credit hours

EAPS 37500 – Great Issues – Fossil Fuels, Energy and Society

Credit Hours: 3.00. Prosperity of the 20th century was based on abundant and cheap energy; during the 21st century we will be faced with difficult challenges. Our society will face higher energy prices, decline of petroleum based fuels supplies,

increased environmental effects of fossil fuels usage, and the challenge of solving the technological problems of developing alternative fuels. This course will review the structure, economics, and geopolitical issues faced by fossil fuel industries and the mitigation strategies that will be needed to change to low fossil fuel use society based on low polluting renewable energy sources. Counts for Great Issues course in College of Science for Juniors and Seniors. Typically offered Fall Spring.
3.000 Credit hours

Engineering Education

CRN	SUBJECT	COURSE	SECTION	CAMPUS	CREDITS	TITLE	DAYS	TIME	ATTRIBUTE
20521	ENE	59000	001	West Lafayette	1-6	Special Problems in Engineering Education	TBA	TBA	June 14 – August 03 Individual Study
20132	ENE	59000	003	West Lafayette	1-6	Special Problems in Engineering Education	TBA	TBA	June 14- August 03 Individual Study
18758	ENE	59000	004	West Lafayette	1-6	Special Problems in Engineering Education	TBA	TBA	June 14- August 03 Individual Study

ENE 59000- Special Problems in Engineering Education

Credit Hours: 1.00 to 6.00. Project or special topics of contemporary importance or of special interest that are outside the scope of the standard graduate curriculum. Interested students should seek a faculty advisor by meeting individual faculty members who work in their area of special interest and prepare a brief description of the work to be undertaken and expected outcomes and deliverables. An individual project must be approved by the faculty member supervising the project and the student's advisor before registering for the course. An approved written report is required. Permission of instructor required. Typically offered Fall Spring Summer.
1.000 TO 6.000 Credit hours

Mathematics

CRN	SUBJECT	COURSE	SECTION	CAMPUS	CREDITS	TITLE	DAYS	TIME	ATTRIBUTE
24807	MA	30300	931	West Lafayette	3	Differential Equations and Partial Differential Equations for Engineering and the Sciences	TBA	TBA	Upper Division June 14 – Aug 03 Asynchronous Online Distance Learning
10834	MA	51100	CXE	West Lafayette	3	Linear Algebra with Applications	TBA	TBA	June 14- August 03 Distance Learning
29153	MA	51100	DIS	West Lafayette	3	Linear Algebra with Applications	TBA	TBA	June 14- August 03 Asynchronous Online Distance Learning
29325	MA	52700	CXE	West Lafayette	3	Advanced Mathematics for Engineers and Physicists I	TBA	TBA	June 14- August 03 Distance Learning
29154	MA	52700	DIS	West Lafayette	3	Advanced Mathematics for Engineers and Physicists I	TBA	TBA	June 14- August 03 Asynchronous Online Distance Learning

28722	MA	59800	DS	West Lafayette	1	Linear Algebra for Data Sci	TBA	TBA	June 01 - July 02 Upper Division, Variable Title Distance Learning
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MA 30300 – Differential Equations and Partial Differential Equations for Engineering and the Sciences

Credit Hours: 3.00. This is a methods course for juniors in any branch of engineering and science, designed to follow MA 26200 or MA 26600. Materials to be covered are: linear systems of ordinary differential equations, nonlinear systems, Fourier series, separation of variables for partial differential equations, and Sturm-Liouville theory. Typically offered Fall Spring Summer.
3.000 Credit hours

MA 51100- Linear Algebra with Applications

Credit Hours: 3.00. Real and complex vector spaces; linear transformations; Gram-Schmidt process and projections; least squares; QR and LU factorization; diagonalization, real and complex spectral theorem; Schur triangular form; Jordan canonical form; quadratic forms. Typically offered Summer.
3.000 Credit hours

MA 52700- Advanced Mathematics for Engineers and Physicists I

Credit Hours: 3.00. MA 52700 is not a prerequisite for MA 52800; these courses can be taken independently. Topics in MA 52700 include linear algebra, systems of ordinary differential equations, Laplace transforms, Fourier series and transforms, and partial differential equations. MA 51100 is recommended. Typically offered Fall.
3.000 Credit hours

MA 59800- Topics in Mathematics

Credit Hours: 1.00 to 5.00. Supervised reading courses as well as dual-level special topics courses are given under this number. Permission of instructor required. Typically offered Fall Spring Summer.
1.000 TO 5.000 Credit hours

Statistics

CRN	SUBJECT	COURSE	SECTION	CAMPUS	CREDITS	TITLE	DAY S	TIME	ATTRIBUTE
24109	STAT	35000	003	West Lafayette	3	Introduction to Statistics	TBA	TBA	Upper Division June 14 – Aug 03 Distance Learning
24406	STAT	50300	Y01	West Lafayette	3	Statistical Methods for Biology	TBA	TBA	Upper Division June 14- August 03 Distance Learning
29256	STAT	51100	003	West Lafayette	3	Statistical Methods	TBA	TBA	Upper Division June 14 - August 03 Asynchronous Online Distance Learning
29779	STAT	51200	CXE	West Lafayette	3	Applied Regression Analysis	TBA	TBA	Upper Division June 14 - August 03 Distance Learning
14457	STAT	51200	EPE	West Lafayette	3	Applied Regression Analysis	TBA	TBA	Upper Division June 14 - August 03 Distance Learning
14296	STAT	59800	006	West Lafayette	1	Probability and Statistics	TBA	TBA	Dept Credit, Upper Division, Variable Title June 07 – July 09 Distance Learning

STAT 35000 – Introduction to Statistics

Credit Hours: 3.00. A data-oriented introduction to the fundamental concepts and methods of applied statistics. Exploratory analysis of data. Sample design and experimental design. Probability distributions and simulation. Sampling distributions. The reasoning of statistical inference. Confidence intervals and tests for one and two samples. Inference for contingency tables, regression, and correlation. Introduction to regression with several explanatory variables. Essential use is made of statistical software throughout. Intended primarily for students majoring in the mathematical sciences. For statistics majors and minors, credit should be allowed in no more than one of STAT 30100, 35000, 50100, and in no

more than one of STAT 50300 and STAT 51100. Prerequisite: two semesters of college calculus. Typically offered Fall Spring.
0.000 OR 3.000 Credit hours

STAT 50300- Statistical Methods for Biology

Credit Hours: 3.00. Introductory statistical methods, with emphasis on applications in biology. Topics include descriptive statistics, binomial and normal distributions, confidence interval estimation, hypothesis testing, analysis of variance, introduction to nonparametric testing, linear regression and correlation, goodness-of-fit tests, and contingency tables. Open only to majors related to the life sciences. For statistics majors and minors, credit should be allowed in no more than one of STAT 30100, STAT 35000, STAT 50100, and in no more than one of STAT 50300 and STAT 51100. Typically offered Fall Spring Summer.
3.000 Credit hours

STAT 51100- Statistical Methods

Credit Hours: 3.00. Descriptive statistics; elementary probability; sampling distributions; inference, testing hypotheses, and estimation; normal, binomial, Poisson, hypergeometric distributions; one-way analysis of variance; contingency tables; regression. For statistics majors and minors, credit should be allowed in no more than one of STAT 30100, STAT 35000, STAT 50100, and in no more than one of STAT 50300 and STAT 51100. Prerequisite: Two semesters of college calculus. Typically offered Fall Spring.
3.000 Credit hours

STAT 51200- Applied Regression Analysis

Credit Hours: 3.00. Inference in simple and multiple linear regression, residual analysis, transformations, polynomial regression, model building with real data, nonlinear regression. One-way and two-way analysis of variance, multiple comparisons, fixed and random factors, analysis of covariance. Use of existing statistical computer programs. Prerequisite: Coursework in Statistical Methods with a calculus prerequisite. Typically offered Fall Spring Summer.
0.000 OR 3.000 Credit hours

STAT 59800- Topics in Statistical Methods

Credit Hours: 0.00 to 6.00. (West Lafayette, IUPUI) 1.00 to 3.00 (North Central) Directed study and reports for students who wish to undertake individual reading and study on approved topics. Permission of instructor required. Typically offered Fall Spring Summer.
0.000 TO 6.000 Credit hours

Technology

CRN	SUBJECT	COURSE	SECTION	CAMPUS	CREDITS	TITLE	DAYS	TIME	ATTRIBUTE
12695	TECH	64600	001	West Lafayette	3	Analysis of Research in Industry and Technology	TBA	TBA	May 17 – August 05 Distance Learning

TECH 64600- Analysis of Research in Industry and Technology

Credit Hours: 3.00. Analysis of research and evaluation of research reports. Emphasis on understanding the application of fundamental statistical methods in design and interpretation of research findings in industrial, technical, and human resource development environments. Prerequisite: Master's student standing. Typically offered Fall Spring Summer.
0.000 OR 3.000 Credit hours