INTEGRATED SCIENCE GROUP MAJOR IN COMBINATION WITH PHYSICS MINOR FOR SECONDARY TEACHING

October 2019

The **Integrated Science major** (State Code: DI) for Secondary Certification consists of **40 credits** distributed over three areas of emphasis: Life Science, Earth and Space Science, and Physical Science. The courses must include significant laboratory experiences.

Teacher candidates for certification in Integrated Science at the Secondary level must pass the Michigan Test for Teacher Certification (MTTC) in Secondary Integrated Science (Test #094). MTTC content exams should not be taken until 90% of course work in the subject area has been completed. A study guide is available at the MTTC website: (http://www.mttc.nesinc.com/PDFs/MI_field094_SG.pdf).

The courses below meet State standards and have been selected so that teacher candidates will be well prepared for the test. Knowledge must be demonstrated in the following categories in order to successfully pass the MTTC subject area exam:

	Subarea	Approximate % of Questions
1.	Constructing and Reflecting on Scientific Knowledge	25%
2.	Life Science	25%
3.	Earth and Space Sciences	25%
4.	Physical Sciences	25%

PLEASE REFER TO YOUR DEGREE EVALUATION IN KNOWHOPE PLUS IN ADDITION TO THIS DOCUMENT TO DETERMINE FULFILLMENT OF COURSE REQUIREMENTS

LIFE SCIENCE COURSES (12 Credits) – Required

SUBJECT/ COURSE	TITLE	CR. HRS.	SEMESTER TAKEN	SUBSTITUTION
BIOL 105 & BIOL 107	Introduction to Biology I & Introduction to Biology I Lab	3 & 1		
BIOL 106 & BIOL 108	General Biology II & General Biology II Lab	3 & 1		
BIOL 221	Human Physiology	4		

EARTH AND SPACE SCIENCE COURSES (12 Credits) – Required

SUBJECT/ COURSE	TITLE	CR. HRS.	SEMESTER TAKEN	SUBSTITUTION
GEMS 130	Introduction to Environmental Science	4		
GEMS 157 (GES 100)	The Planet Earth	4		
GES 203	Historical Geology	4		

PHYSICAL SCIENCE COURSES (16 Credits) - Required

SUBJECT/ COURSE	TITLE	CR. HRS.	SEMESTER TAKEN	SUBSTITUTION
PHYS 121* & PHYS 141*	General Physics I & Physics Lab I	3 1		
PHYS 122* & PHYS 142*	General Physics II & Physics Lab II	3 1		
CHEM 125 & CHEM 127	General Chemistry I & Lab of General & Analytic Chemistry I	3 1		
CHEM 126 & CHEM 128	General Chemistry II & Lab of General & Analytic Chemistry II	3 1		
*MATH 126 or MATH131 is a corequisite or prerequisite for PHYS 121/141 and MATH 132 is a prerequisite or corequisite for PHYS122/142				

OTHER COURSES (4 Credits)

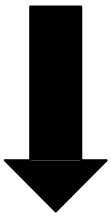
(The required Science methods course is considered pedagogy and will be counted with your education courses for certification.)

SUBJECT/ COURSE	TITLE	CR. HRS.	SEMESTER TAKEN	SUBSTITUTION
EDUC 331	Teaching of Science in the Secondary School (offered Fall Semester Only)	3		
EDUC 332	Teaching of Science in the Secondary School Field Placement (offered Fall Semester Only)	1		

This MUST be completed prior to the student teaching semester!

PHYSICS MINOR WORKSHEET AND "SAMPLE" 4 YEAR PLAN

ON THE FOLLOWING PAGES BELOW



PHYSICS MINOR IN COMBINATION WITH INTEGRATED SCIENCE GROUP MAJOR FOR SECONDARY TEACHING

Updated February 2020

The **Physics minor** (State Code: DE) for Secondary teachers consists of a minimum of 20 credits in Physics. Cognate courses are also required beyond the 20 hours.

Teacher candidates for certification in Physics at the Secondary level must pass the Michigan Test for Teacher Certification (MTTC) in Physics (Test #019). MTTC content exams should not be taken until 90% of course work in the subject area has been completed. A study guide is available at the MTTC website: (http://www.mttc.nesinc.com/PDFs/MI_field019_SG.pdf).

The courses below meet State standards and have been selected so that teacher candidates will be well prepared for the test. Knowledge must be demonstrated in the following categories in order to successfully pass the MTTC subject area exam:

	Subarea	Approximate % of Questions
1.	Foundations of Scientific Inquiry	12%
2.	Mechanics	24%
3.	Electricity and Magnetism	24%
4.	Waves, Acoustics, and Optics	20%
5.	Nature of Matter, Thermodynamics, and Modern Physics	20%

The following chart is intended to provide you a guide for scheduling your semesters and for keeping track of your grade point average.

PLEASE REFER TO YOUR DEGREE EVALUATION IN KNOWHOPE PLUS IN ADDITION TO THIS DOCUMENT TO DETERMINE FULFILLMENT OF COURSE REQUIREMENTS

PHYSICS REQUIRED CORE (16 credits) May double count courses marked with an asterisk (*) with DI major.

SUBJECT/ COURSE	TITLE	CREDIT HOURS	SEMESTER	GRADE
PHYS 121	General Physics I*	3		
PHYS 141	Physics Lab I*	1		
PHYS 122	General Physics II*	3		
PHYS 142	Physics Lab II*	1		
PHYS 270	Modern Physics (every fall)	4		
PHYS 280	Intro. to Mathematical Physics (every spring)	2		
PHYS 281	Intermediate Physics Lab (every spring)	2		

ADVANCED COURSES IN PHYSICS (4 credits)**

SUBJECT/ COURSE	TITLE	CREDIT HOURS	SEMESTER	GRADE
PHYS 342	Electricity and Magnetism (spring even yrs)	4		
PHYS 352	Optics (occasionally)	3		
PHYS 361	Analytical Mechanics[1] (every fall)	4		
PHYS 362	Thermodynam. & Stat. Mechanics (fall even yrs)	4		
PHYS 372	Quantum Theory (spring odd yrs)	4		
PHYS 382	Advanced Physics Lab (every fall)	2		

** PHYS 361 was moved from a required course to an elective course, therefore, if this course is not taken, a substitution form will need to be completed.

[1] Programming competency is a prerequisite for this course.

REQUIRED COGNATE COURSES

MATH (16 credits)

SUBJECT/ COURSE	TITLE	CREDIT HOURS	SEMESTER	GRADE
MATH 131	Calculus	4		
MATH 132	Calculus II	4		
MATH 231	Multivariable Math I	4		
MATH 232	Multivariable Math II	4		

"SAMPLE" 4 YEAR PLAN

ON THE FOLLOWING PAGES BELOW

SAMPLE
Integrated Science Major (DI) with a Physics Minor
FOR SECONDARY CERTIFICATION
4 year plan

NOTE:
1. In order to student teach a minimum G.P.A. of 2.75 is required in your major, minor, education classes, and overall.
2. Students earning a Secondary Major must complete field placements in middle and high school.
3. Students earning a Secondary Major must complete field placements in racially/ethnically and socio-economically diverse classrooms.

November 2021

	Fall			Spring			Summer		
	CLASS	CR	ATTRIBUTES	CLASS	CR	ATTRIBUTES	CLASS	CR	ATTRIBUTES
FRESHMAN	IDS 100	2	GE-FYS	EDUC 200/201	4	ED & GLD	For Lang 2	4	GE-FL2
	PHYS 121/141	4	DI & GE-NSL	PHYS 122/142	4	DI			
	KIN 140	2	GE-HD	MATH 132	4	m			
	MATH 131	4	GE-MA2 & m	EDUC270	4	ED			
	ENGL 113	4	GE-EW						
	Total	16		Total	16				
SOPHMORE	EDUC 225/226	4	ED	CHEM 126/128	4	DI	REL 200	4	GE-REL2
	CHEM 125/127	4	DI	BIOL 106/108	4	DI			
	BIOL 105/107	4	DI	Fine Arts 1	4	GE-FA1			
	MATH 231	4	m	GES 100	4	DI & GE-NSL			
	Total	16		Total	16				
JUNIOR	EDUC 275/276	3	ED	EDUC 285/286	4	ED	IDS 171	4	GE-CH1 & GLI
	BIOL 221	4	DI	EDUC 287	2	ED			
	PHYS 270	4	M	PHYS 280	2	DI			
	MATH 232	4	m	PHYS 281	2	DI			
	Social Sci 2	2	GE-SS2	GES 203	4	DI			
				Fine Arts 2	2	GE-FA2			
	Total	17		Total	16				
SENIOR	EDUC 360/361	3	ED	EDUC 455	1	ED	IDS 172	4	GE-CH2
	EDUC 331/332	4	DI & ED	EDUC 480	10	ED			
	PHYS elective	4	m	EDUC 500	1	ED & GE-SS1			
	GEMS 130	4	DI	IDS 452	4	GE-SRS			
	REL 1	2	GE-REL1						
	Total	17		Total	16				

Note: G.L.I. (global learning international) possibilities – check degree evaluation, FYS, ENGL 113, IDS 171, Rel2 and select History and Literature courses

*Increasingly we see students bringing in AP credits for English, Math, and some of the social sciences (Psychology or Sociology being most common). If a student does bring in some of these credits, it could eliminate the need for summer courses.

Key:
GE – General Education
ED – Education
GLD – Global Learning Domestic
GLI – Global Learning International
m – minor

1. Please see an education faculty member for personal advising. This sample is simply *one* way to plan your schedule.
2. Please consult the Hope College Catalogue for semesters when courses are offered, as these may vary.