

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 | CREDITS | SEMESTER | GRADE |
|---------------------------|---|---------|----------|-------|
| 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 | CREDITS | SEMESTER | GRADE |
|-----------------------|---------------------------------------|---------|----------|-------|
| 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 | CREDITS | SEMESTER | GRADE |
|---------------------------|---|---------|----------|-------|
| 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 | | |

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 | CREDITS | SEMESTER | GRADE |
|--------------------|---|---------|----------|-------|
| 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.

February 2020

| | Fall | | | Spring | | | Summer | | |
|-----------------|---------------|----|-------------|--------------|----|-------------|------------|----|--------------|
| | CLASS | CR | ATTRIBUTES | CLASS | CR | ATTRIBUTES | CLASS | CR | ATTRIBUTES |
| FRESHMAN | IDS 100 | 2 | GE-FYS | EDUC 220/221 | 4 | ED | For Lang 2 | 4 | GE-FL2 |
| | PHYS 121/141 | 4 | DI & GE-NSL | IDS 200 | 4 | ED & GE-GLD | | | |
| | KIN 140 | 2 | GE-HD | PHYS 122/142 | 4 | DI | | | |
| | MATH 131 | 4 | GE-MA2 & m | MATH 132 | 4 | m | | | |
| | 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 |
| | EDUC 270 | 2 | ED | BIOL 106/108 | 4 | DI | | | |
| | CHEM 125/127 | 4 | DI | Fine Arts 1 | 4 | GE-FA1 | | | |
| | BIOL 105/107 | 4 | DI | GES 100 | 4 | DI & GE-NSL | | | |
| | MATH 231 | 4 | m | | | | | | |
| Total | 18 | | 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 | | | |
| 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.