

## BS Mathematical Sciences Physics track- Fall 2022

The major in Mathematics – Physics Track gives an opportunity for undergraduate mathematics students interested in physics to be exposed to the interplay between the two disciplines. It also provides a firm mathematical foundation needed for graduate studies in the physical sciences.

**Course Availability: This is when courses are typically offered and is subject to change:**  
F (Fall), S (Spring), SS (Summer) F = Fall, S = Spring, SS = Summer

### Common Prerequisites (28-29 credits)

Complete all of the following with a grade of “C” or better (15 credits)

| Course   | Description            | Pre-requisites                                                                                          | Term offered | Units |
|----------|------------------------|---------------------------------------------------------------------------------------------------------|--------------|-------|
| MAC 2311 | Calculus I             | Grade of “C” or higher in MAC 1147 or MAC 1140 + MAC 1114 (or placement score without prior coursework) | F, S, SS     | 4     |
| MAC 2312 | Calculus II            | MAC 2311                                                                                                | F, S, SS     | 4     |
| MAC 2313 | Multivariable Calculus | MAC 2312                                                                                                | F, S, SS     | 4     |
| MAP 2302 | Differential Equations | MAC 2312                                                                                                | F, S, SS     | 3     |

Complete one of the following with a grade of “C” or better (3-4 credits):

|          |                      |                                              |          |   |
|----------|----------------------|----------------------------------------------|----------|---|
| COP 2210 | Intro to Programming | MAC 1140 or MAC 1147 or MAC 2233 or MAC 2311 | F, S, SS | 4 |
| COP 2250 | Java Programming     |                                              | F, S, SS | 3 |
| COP 2047 | Python Programming I |                                              | F, S, SS | 3 |

Completion of one lecture with corresponding labs (4-5 credits) with a grade of “C” or better. **PHY 2048 & L and PHY 2049 & L are strongly recommended for students in the physics track. See the note below\***

|                  |                               |                                                                                                                                 |                 |          |
|------------------|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------|-----------------|----------|
| BSC 2010         | General Biology I             | Co-requisite: BSC 2010L                                                                                                         | F, S, SS        | 3        |
| BSC 2010L        | General Biology I Lab         | Co-requisite: BSC 2010                                                                                                          | F, S, SS        | 1        |
| BSC 2011         | General Biology II            | Co-requisite: BSC 2011L                                                                                                         | F, S, SS        | 3        |
| BSC 2011L        | General Biology II Lab        | Co-requisite: BSC 2011                                                                                                          | F, S, SS        | 1        |
| CHM 1045         | General Chemistry I           | “C” grade or higher in MAC 1105 or appropriate placement score (if no prior coursework in Math/Chem)<br>Co-requisite: CHM 1045L | F, S, SS        | 3        |
| CHM 1045L        | General Chemistry I Lab       | Co-requisite: CHM 1045                                                                                                          | F, S, SS        | 1        |
| CHM 1046         | General Chemistry II          | Prerequisite: CHM 1045<br>Co-requisite: CHM 1046L                                                                               | F, S, SS        | 3        |
| CHM 1046L        | General Chemistry II Lab      | Co-requisite: CHM 1046                                                                                                          | F, S, SS        | 1        |
| <b>*PHY2048</b>  | <b>Physics W/Calculus I</b>   | <b>Pre- or Co-requisite: MAC2311</b>                                                                                            | <b>F, S, SS</b> | <b>4</b> |
| <b>*PHY2048L</b> | <b>General Physics Lab I</b>  | <b>N/A</b>                                                                                                                      | <b>F, S, SS</b> | <b>1</b> |
| <b>*PHY2049</b>  | <b>Physics W/Calculus II</b>  | <b>Pre- or Co-requisite: MAC2312</b><br><b>Prerequisite: PHY 2048</b>                                                           | <b>F, S, SS</b> | <b>4</b> |
| <b>*PHY2049L</b> | <b>General Physics Lab II</b> | <b>Pre-requisite: PHY 2048L</b>                                                                                                 | <b>F, S, SS</b> | <b>1</b> |
| GLY 1010         | Physical Geology              | N/A                                                                                                                             | F, S, SS        | 3        |
| GLY 1010L        | Physical Geology Lab          | N/A                                                                                                                             | F, S, SS        | 1        |

**\* PHY 2048 and PHY 2049 are required for upper division Physics courses**

## Required Courses (46-47 credits)

Complete all of the following with a grade of “C” or better (28 credits)

| Course    | Description               | Pre-requisites                                            | Term offered | Units |
|-----------|---------------------------|-----------------------------------------------------------|--------------|-------|
| MAD 2104  | Discrete Mathematics      | MAC 1105 or appropriate placement score                   | F, S, SS     | 3     |
| MAS 3105  | Linear Algebra            | MAC 2312                                                  | F, S, SS     | 3     |
| MAA 3200  | Intro to Advanced Math    | MAC 2312 and MAD 2104                                     | F, S         | 3     |
| MAD 3401  | Numerical Analysis        | COP 2210 or COP 2250 or COP 2270 or CGS 2420 and MAC 2312 | F, S         | 3     |
| MAP 4104C | Topics in Math Modeling   | MAP 2302, MAC 2313, MAS 3105                              | F            | 4     |
| MAP 4401  | Advanced Differential Eqs | MAP 2302 and MAC 2313                                     | S            | 3     |
| STA 4321  | Mathematical Statistics I | MAC 2313                                                  | F            | 3     |
| PHY 3106  | Modern Physics            | PHY 2049                                                  | F, S         | 3     |
| PHY 3802L | Intermediate Physics Lab  | Co-requisite: PHY 3106                                    | F, S         | 3     |

Complete one of the following with a grade of “C” or better (3 credits):

| Course   | Description                                      | Pre-requisites                                             | Term offered | Units |
|----------|--------------------------------------------------|------------------------------------------------------------|--------------|-------|
| IDS 4174 | Mathematics and Philosophy in Arts- GL           | N/A                                                        | F            | 3     |
| MHF 3404 | History of Mathematics- GL                       | MAC 2312 "C" or MAC 2311 and permission of the instructor. | F            | 3     |
| MHF 4401 | Methods in the History of Modern Mathematics- GL | MAC 2313 and MAS 3105                                      | S            | 3     |

Select any two of the following course sequences with a grade of “C” or better (12-13 credits)

OPTION 1 (7 credits)

| Course   | Description                  | Pre-requisites     | Term offered | Units |
|----------|------------------------------|--------------------|--------------|-------|
| PHY 4221 | Intro to Classical Mechanics | PHY 2049, MAC 2313 | F            | 4     |
| PHY 4222 | Adv Classical Mechanics      | PHY 4221           | S            | 3     |

OPTION 2 (6 credits)

| Course   | Description          | Pre-requisites                                       | Term offered | Units |
|----------|----------------------|------------------------------------------------------|--------------|-------|
| PHY 4323 | Interm Electromag I  | MAC 2313, PHY 2049 and pre- or co-requisite MAP 2302 | F            | 3     |
| PHY 4324 | Interm Electromag II | PHY 4323                                             | S            | 3     |

OPTION 3 (6 credits)

| Course   | Description          | Pre-requisites               | Term offered | Units |
|----------|----------------------|------------------------------|--------------|-------|
| PHY 4604 | Quantum Mechanics I  | PHY 3106, MAP 2302, MAC 2313 | F            | 3     |
| PHY 4605 | Quantum Mechanics II | PHY 4604                     | S            | 3     |

## Mathematics Electives (3 credits)

Pick 1 from the following list of electives with a grade of “C” or better (3 credits)

| Course   | Description                                   | Pre-requisites                                                    | Term offered    | Units |
|----------|-----------------------------------------------|-------------------------------------------------------------------|-----------------|-------|
| MAA 4211 | Advanced Calculus I                           | MAC 2313, MAS 3105, and MAA 3200                                  | S               | 3     |
| MAA 4402 | Complex Variables                             | MAC 2313, and MAP 2302 or MAA 4211                                | F               | 3     |
| MAA 4504 | Functional Analysis                           | MAC 2313, MAC 3105                                                | Consult Advisor | 3     |
| MAP 4215 | Stochastic Diff Equations                     | MAP 2302, MAC 2313, MAS 3105, STA 4321                            | F               | 3     |
| MAP 4315 | Nonlinear Dynamics w Applications to Sciences | MAC 2313 or MAP 2302 or MAS 3105, or permission of the instructor | Consult Advisor | 3     |
| MAP 4412 | Intro to Fourier Analysis                     | MAC 2313, MAS 3105                                                | Consult Advisor | 3     |
| MAS 4301 | Algebraic Structures                          | MAS 3105 and MAA 3200                                             | S               | 3     |

|          |                            |                                                                |            |   |
|----------|----------------------------|----------------------------------------------------------------|------------|---|
| MTG 4254 | Differential Geometry      | MAC 2311, MAS 3105, MAP 2302 or permission from the instructor | S, alt yrs | 3 |
| STA 4322 | Mathematical Statistics II | STA 4321                                                       | S          | 3 |

Graduation Requirements:

- University Core Curriculum (UCC)
- Minimum of a 2.0 GPA
- 45 credits of Upper Division hours (3000-4000 level)
- 120 credit hours required for graduation
- Foreign Language requirement (FLENT/FLEX)
- Civic Literacy requirement

Students interested in Secondary Teacher Certification should contact the College of Arts, Sciences & Education Center for Advising & Student Success at (305) 348-2978