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or

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Areas of Emphasis

In meeting the above requirements, students may choose an area of emphasis. Students who wish to complete an emphasis should plan a program of study in consultation with their advisors. Some

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Emphasis in Astrobiology

This emphasis prepares students for careers in research, teaching, or science journalism. Students must take the following and complete a senior project or internship.

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Emphasis in Computational Astronomy

This emphasis prepares students planning for computation and information-related jobs in industry and government labs. Students must take 9 credits of the following. In addition, they should complete a senior project or internship.

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or

Program Approval Form

For approval of new programs and deletions or modifications to an existing program.

Action Requested:

- [ ] Create New (SCHEV approval required except for minors and certificates)
- [ ] Delete Existing
- [x] Modify Existing (check all that apply)
  - [ ] Title (SCHEV approval required except for minors, certificates)
  - [ ] **Concentration** (Choose one): [ ] *Add* [ ] *Delete* [ ] *Modify*
  - [x] Degree Requirements
  - [ ] Admission Standards
  - [ ] Application Requirements
  - [ ] Other Changes: _____

Type (Check one)**:**

- [ ] B.A. [x] B.S. [ ] Minor
- [ ] Undergraduate Certificate
- [ ] M.A. [ ] M.S. [ ] M.Ed.
- [ ] Ph.D. [ ] Graduate Certificate
- [ ] Other: _____

College/School:	College of Science	**Department:**	SPACS		
Submitted by:	Joseph Weingartner	**Ext:**	3-4596	**Email:**	jweinga1@gmu.edu

Effective Term: Fall 2012

Please note: For students to be admitted to a new degree, minor, certificate or concentration, the program must be fully approved, entered into Banner, and published in the University Catalog.

ustification: (attach separate document if necessary)

Currently, the required introductory astronomy course is ASTR 103 or 113. We are replacing this with the new, more quantitative introduction ASTR 210. This will better prepare majors for the 300- and 400-level astronomy courses.

	Existing	New/Modified
Program Title: (Required) Title must identify subject matter. Do not include name of college/school/dept.	Astronomy, BS	Astronomy, BS
Concentration(s):		
Admissions Standards / Application Requirements: (Required only if different from those listed in the University Catalog)		
Degree Requirements: Consult University Catalog for models, attach separate document if necessary using track changes for modifications	ASTR 103 or 113 (3 credits) ASTR 402 (3 credits) ASTR 428	ASTR 210 (3 credits) ASTR 402 (4 credits) PHYS 428
Courses offered via distance: (if applicable)		
TOTAL CREDITS REQUIRED:	65	66

Approval Signatures

Department	Date	College/School	Date	Provost's Office *Interdisciplinary Council Use Only*	Date

If this program may impact another unit or is in collaboration with another unit at Mason, the originating department must circulate this proposal for review by those units and obtain the necessary signatures prior to submission. Failure to do so will delay action on this proposal.

Unit Name	Unit Approval Name	Unit Approver's Signature	Date

Justification of Changes

1. Currently the required astronomy course is ASTR 103 or 113. We are replacing this with the new, more quantitative introduction ASTR 210. This will better prepare majors for the 300- and 400-level astronomy courses.

2. ASTR 402 has been revised from a 3-credit course to a 4-credit course. Thus, the total credits for the major has increased from 65 to 66 and the number of credits in the first category ("Required astronomy courses") has increased from 9 to 10.

3. The existing courses ASTR 428 and PHYS 428 are identical, cross-listed courses. ASTR 428 is being deleted to reduce redundancy. Thus, ASTR 428 is being replaced with PHYS 428 in the list of required courses.

4. The sample schedule is modified to reflect the above changes as well as previous changes that were not incorporated into the sample schedule when they were made.

5. The areas of emphasis are deleted. Astronomy majors have not found these useful. In addition, some of the courses in the areas of emphasis are rarely, if ever, offered.

New Catalog Copy (revisions from old copy crossed out):

Banner Code: SC-BS-ASTR

The BS in astronomy prepares students for graduate school, a career in research or teaching positions, or employment in industry, business, or education fields where analytical skills and a scientific background are advantageous. Students who are considering a double major should talk to the undergraduate coordinator. Note that at least 18 credits used to fulfill an astronomy BS cannot be used to fulfill another major or minor. Some course substitutions are allowed for double majors, but these must be approved by the department.

Students must fulfill all requirements for bachelor's degrees including university general education requirements. In addition, students must complete a total of 52 credits in physics and astronomy and 14 credits in mathematics with a minimum GPA of 2.00. Through the course work below, astronomy majors satisfy the university-wide requirements in natural science and quantitative reasoning. Also, by taking ASTR 402, astronomy majors satisfy the university's writing-intensive requirement.

This program of study is offered by the School of Physics, Astronomy, and Computational Sciences in the College of Science.

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Degree Requirements

Required astronomy courses (10 credits):

- ASTR 210 – Introduction to Astrophysics Credits: 3
- ASTR 328 - Stars and Interstellar Medium Credits: 3
- ASTR 402 - Methods of Observational Astronomy Credits: 4

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Deleted: ASTR 113 - Introductory Astronomy: Stars, Galaxies, and the Universe

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Additional astronomy courses (6 credits)

- Pick two of the following:

- ASTR 403 - Planetary Sciences Credits: 3
- ASTR 404 - Galaxies and Cosmology Credits: 3
- PHYS 428 - Relativity Credits: 3

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Required physics courses (21 credits):

- PHYS 160 - University Physics I Credits: 3
- PHYS 161 - University Physics I Laboratory Credits: 1

- PHYS 260 - University Physics II Credits: 3
- PHYS 261 - University Physics II Laboratory Credits: 1
- PHYS 262 - University Physics III Credits: 3
- PHYS 263 - University Physics III Laboratory Credits: 1
- PHYS 303 - Classical Mechanics Credits: 3
- PHYS 305 - Electromagnetic Theory Credits: 3
- PHYS 308 - Modern Physics with Applications Credits: 3

Required math courses (14 credits):

MATH 113 - Analytic Geometry and Calculus I Credits: 4
- MATH 114 - Analytic Geometry and Calculus II Credits: 4
- MATH 213 - Analytic Geometry and Calculus III Credits: 3
- MATH 214 - Elementary Differential Equations Credits: 3

15 credits from the following:

(at least 12 credits must be from upper-level courses)

- ASTR 301 - Astrobiology Credits: 3
- ASTR 408 - Senior Research Credits: 3
- PHYS 306 - Wave Motion and Electromagnetic Radiation Credits: 3
- PHYS 307 - Thermal Physics Credits: 3
- PHYS 402 - Introduction to Quantum Mechanics and Atomic Physics Credits: 3
- ASTR 403, ASTR 404 or PHYS 428, if not picked as additional astronomy courses, may be used here.
- Any other ASTR or PHYS course with the permission of the department

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Deleted: ***emphases listed below require more than 12 credits in the last category above. It is not necessary to complete an emphasis, as the base program provides full preparation for graduate school.***

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Deleted: BIOL 213 - Cell Structure and Function

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Deleted: Credits: 4

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Deleted: BIOL 305 - Biology of Microorganisms

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Deleted: Credits: 3

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Deleted: BIOL 506 - Selected Topics in Microbiology

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Deleted: Credits: 1-4

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Deleted: **<#>**ASTR 408 - Senior Research Credits: 3

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<#>Emphasis in Computational Astronomy ... [4]

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Deleted: ASTR 409 - Astronomy Internship

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Sample Schedule for Astronomy BS

First Semester

- MATH 113 - Analytic Geometry and Calculus I Credits: 4
- ENGH 101 - Composition Credits: 3
- General Education Course Credits: 3
- General Education Course Credits: 3
- UNIV 100 Credit: 1

Second Semester

- MATH 114 - Analytic Geometry and Calculus II Credits: 4
- PHYS 160 - University Physics I Credits: 3
- PHYS 161 - University Physics I Laboratory Credits: 1
- General Education Course Credits: 3
- General Education Course Credits: 3

Third Semester

- PHYS 260 - University Physics II Credits: 3
- PHYS 261 - University Physics II Laboratory Credits: 1
- MATH 213 - Analytic Geometry and Calculus III Credits: 3
- General Education Course Credits: 3
- General Education Course Credits: 3
- Elective Course Credits: 3

Fourth Semester

- PHYS 262 - University Physics III Credits: 3
- PHYS 263 - University Physics III Laboratory Credits: 1
- MATH 214 - Elementary Differential Equations Credits: 3
- ASTR 210 – Introduction to Astrophysics Credits: 3
- General Education Course Credits: 3
- Elective Course Credits: 3

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Deleted: <#>PHYS 251 - Introduction to Computer Techniques in Physics Credits: 3

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Deleted: PHYS 510 - Computational Physics I

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Deleted: MATH 447 - Numerical Analysis II

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Deleted: Credits: 3

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Deleted: <#>ASTR 408 - Senior Research Credits: 3

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Deleted: ASTR 409 - Astronomy Internship

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Deleted: ASTR 103 - Astronomy

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Deleted: Credits: 3

Fifth Semester

- ASTR 328 - Stars and Interstellar Medium Credits: 3
- PHYS 303 - Classical Mechanics Credits: 3
- PHYS 305 - Electromagnetic Theory Credits: 3
- ENGH 302 - Advanced Composition Credits: 3
- Elective Course Credits: 3

Sixth Semester

- ASTR 404 - Galaxies and Cosmology Credits: 3
- PHYS 308 - Modern Physics with Applications Credits: 3
- PHYS 306 – Wave Motion and Electromagnetic Radiation Credits: 3
- Elective Course Credits: 3
- Elective Course Credits: 3

Seventh Semester

- ASTR 402 - Methods of Observational Astronomy Credits: 4
- ASTR 403 - Planetary Sciences Credits: 3
- ASTR 408 - Senior Research Credits: 3
- PHYS 402 - Introduction to Quantum Mechanics and Atomic Physics Credits: 3
- Elective Course Credits: 3

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Eighth Semester

- PHYS 428 - Relativity Credits: 3
- PHYS 307 - Thermal Physics Credits: 3
- Synthesis Course Credits: 3
- Elective Course Credits: 3
- Elective Course Credits: 3

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