



Arts and Sciences

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July 14, 2009

W. Randy Smith
Vice Provost
Office of Academic Affairs
203 Bricker Hall, 190 N. Oval Mall
CAMPUS

Dear Randy:

The Arts and Sciences Committee on Curriculum and Instruction (CCI) unanimously approved a revision to the **Astronomy Major** on June 12, 2009. The main proposers are Paul Martini (martini@astronomy.ohio-state.edu), Marc Pinsonneault (pinsonneault.1@osu.edu), and Brad Peterson (peterson@astronomy.ohio-state.edu). The CCI Sciences Subcommittee approved the major at their meeting on June 9, 2009 and the Mathematical and Physical Sciences College Curriculum Committee approved this proposal on May 27, 2009. Please see the attached transmittal history for detailed minutes from these meetings.

This proposal covers two separate curricular issues that both work to help attract and retain students, and to help them succeed in the major and after graduation. Due to the curricular overlap between the Astronomy major and the Physics major requirements, a change to add a pre-requisite to several Physics courses inadvertently added pre-requisite requirements for Astronomy majors. This proposal aims to offset that rise in required pre-requisite hours by dropping Physics 664 from the required Astronomy major courses.

The second change to the major adds two credits of a new course (Astronomy 295) which was successfully piloted as an introduction to the field and will be taken twice by students early in their careers to help them identify faculty mentors and directions for careers.

The accompanying transmittal memo goes into detail of the nature of these changes and the impact on students.

Please let me know if I can be of further assistance as CAA considers this proposal.

Sincerely,

A handwritten signature in blue ink that reads "Kathleen M. Hallihan".

Kathleen M. Hallihan
Director, Curriculum and Assessment

c: Randy Smith
Melissa Soave
Terry Gustafson
Christopher Highley

TO: Chris Highley, Chair CCI

FROM: CCI Subcommittee on Social, Behavioral, Mathematical, Physical, and Biological Sciences

RE: Revisions to the Astronomy Major

Dear Chris:

On June 9, 2009 the CCI Sciences Subcommittee considered the proposal to revise the Astronomy Major. The proposal has two components that were discussed separately as outlined below.

1) Request to withdraw Physics 664 from the Astronomy Major Requirements

The Astronomy Major includes many required courses in Physics and many Astronomy majors double major in Physics and Astronomy. Therefore, the content of these two programs is closely linked.

Last year, the Physics department added CSE 202 and Physics 416 as required pre-requisite courses to Physics 555, 621, and 631. This addition was based on student feedback and assessment of student performance in the Physics courses; those students who had a stronger programming and methods background provided by CSE 202 and Physics 416 were better prepared and more successful in Physics 555, 621 and 631. These three courses are also required for Astronomy majors.

The result is that Astronomy majors now have to take an additional two courses as pre-requisites in preparation for their required major courses, thus adding eight credit hours to their total degree program.

In an effort to alleviate the added credit requirements, Astronomy proposes to withdraw Physics 664, from their major requirements. Physics 664 has a different focus than the Physics courses that carry the new pre-requisites, but is not as crucial to the major. Also, many students take 664 anyway as part of the double major with Physics, therefore the academic impact of this withdrawal and four-hour decrease in credit requirement would be fairly low.

This change, coupled with the addition of the two Physics pre-requisite courses, would result in a net increase of four credit hours in total degree requirements.

The subcommittee felt that this change was reasonable and a thoughtful accommodation for students considering that the addition of the pre-requisites in Physics were beyond their control, even though the Astronomy Department fully supports the pedagogical rationale for the additions of the pre-requisites.

2) Request to add the newly approved Astronomy 295 as a requirement to the major

Astronomy 295 is a one-credit course that the department wishes to require students to take two times during recommended quarters at the beginning of their major program. Modeled after a similar Physics course, Astronomy 295 is designed to expose students to Astronomy faculty in order to make students aware of the types of research and careers available with an Astronomy major. It also formalizes students' degree planning process in a major that has 79 hours currently. In this way students will be better prepared to plan their degree program so that they can finish their studies in a timely manner and in a way that best prepares them for success throughout their program of study and beyond. Another crucial feature of Astronomy 295 is helping students get to know faculty early in their studies so that they can make research connections, which, based on two prior Group Studies offerings of this course (Astronomy 294) has proven successful in retaining new majors (a challenge for the department in the past). It can also function as a way to attract new majors to the discipline.

The subcommittee felt that the rationale for this modest, two-hour addition to the major curriculum was solid, and it was noted that similar courses exist in other majors and have proven to be effective in the retention and success of students.

The subcommittee did have questions concerning the numbering and offering pattern of Astronomy 295 which they would like the proposers to address, namely:

- **295 is a one-credit course to be taken twice at recommended times during a student's course of study. Why would this course be taken twice? It was posited that offering the course twice would accommodate faculty availability, ensuring that students could gain exposure to all faculty members, taking into account that all would not be available in any given quarter. The subcommittee would like clarification on this.**
- **If students must take 295 twice, why not decimalize the course to communicate to students that the content is not identical (i.e. 295.01 and .02)? These would not need to be taken sequentially. Alternatively, could the department create a 295 and 296 to differentiate the two offerings?**

Credit Hour Change Summary:

Taking into account both of the above proposed changes to the major, the department is proposing to drop one required course (Physics 664) which will decrease required hours by 4. This withdrawal partially compensates for the addition of two 4-credit pre-requisite course (CSE 202 and Physics 416), which add eight credits to total degree requirements. This results in a net increase of four credits. Additionally, requiring two credits in the form of 295 results in an increase of 2 credit hours required within the major.

The net result is an increase of 6 credit hours for students total degree program. Thus the new total hours required for the major would be 77 but students would have a total of six additional credits to complete their degree program.

The subcommittee voted unanimously to approve the above proposed revisions **contingent upon further clarification of the points bolded above and a summary table which includes the following information in order to provide maximum clarification for CCI and CAA committee vetting:**

A table to include the following:

- 1) Credit hour totals of the Astronomy program *before the addition of CSE 202, Physics 416, and Astronomy 295*, broken down by hours required as pre-requisites, hours required in the major, and GEC hours)

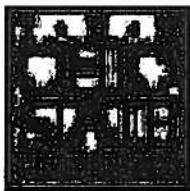
- 2) Credit hour totals of the Astronomy program in its current form *with the addition of CSE 202 and Physics 416* , broken down by hours required as pre-requisites, hours required in the major, and GEC hours

- 3) Credit hour totals of the Astronomy program in its proposed form, *including the addition of CSE 202 and Physics 416, Astronomy 295 and the withdrawal of 664*, broken down by hours required as pre-requisites, hours required in the major, and GEC hours

Contingent upon the above requirements, the approval of the subcommittee stands as a motion to CCI to approve the revisions to the Astronomy Major.

Respectfully submitted,

CCI Subcommittee on Social, Behavioral, Mathematical, Physical, and Biological Sciences

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June 23, 2009

ASC Curriculum and Assessment Office
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Recent changes by the Physics Department have added eight credit hours to the course load of astronomy majors. The Astronomy Department is concerned about this additional burden on our majors and seeks to remove one required course (Physics 664; four credit hours). In addition, based on a study of retention and time to graduate, we propose to add two credits of undergraduate seminar (Astronomy 295) as a requirement of the astronomy major. This recently-approved course is primarily intended for first-year students and aims to improve retention, time to graduate, and inform students about contemporary research. Below is the detailed rationale for these changes. The net result of this proposal would be a two credit hour decrease in the astronomy major program. We note that combined with the (already approved) changes in Physics, there will be a six credit hour increase in the astronomy major relative to two years ago. If this proposal is not approved, the net increase remains eight hours. The detailed rationale for these changes is as follows:

1. Removal of Physics 664 (Theoretical Mechanics)

Last year the Physics Department added Physics 416 (Methods of Experimental Physics) as a prerequisite for Physics 555 (Fields and Waves I), 621 (Statistical Physics I), and 631 (Quantum Physics I) for students who first enroll in Autumn 2008 or afterwards. CSE 202 (Intro to C++ Programming) was made a prerequisite for Physics 416 at the same time. Physics 555, 621, and 631 are required for the astronomy major, while Physics 416 and CSE 202 were not, so this adds eight credit hours (four per course) to the astronomy major (Physics 416 as a major course, CSE 202 as a prerequisite for the major). The motivation for this change is that the Physics Department plans to incorporate more programming into their curriculum. While the Astronomy Department is enthusiastic about the additional programming skills that students will gain from these new prerequisites, and we presently plan to incorporate more programming into our upper level courses as well, we are also concerned that the addition of eight credit hours will overburden our majors and specifically impact their time to graduation. We therefore propose to remove Physics 664 (Theoretical Mechanics, four credit hours) as a requirement. We note that this change will only impact the astronomy majors who do not have a double major with physics, which is approximately half of the astronomy majors. While Physics 664 contains important knowledge, the affected students are generally not

those on our "graduate school track" (we strongly encourage students interested in graduate study to double major with physics). We would continue to recommend Physics 664 to students who only major in astronomy.

2. Addition of Astronomy 295 (Undergraduate Seminar)

We propose to add two instances of Astronomy 295 (Undergraduate Seminar), a one credit hour survey course with no prerequisites and graded pass/fail, as requirements of the astronomy major. This survey course was developed to improve retention, stimulate interest in research, and improve the typical time to graduation. The course is intended for first-year astronomy majors. The content of the course is largely an overview of contemporary astronomy research, although the first several weeks are devoted to the recommended major curriculum, careers options, and undergraduate research opportunities. The rationale to take the course twice is that this provides enough weeks for most of the astronomy faculty to present on their research interests. At present students are strongly encouraged to take this course during their first year (offered Autumn and Winter Quarters), which maximizes the positive impact on their four-year course schedule and also provides them with a palpable link to the Astronomy Department faculty (otherwise astronomy majors do not normally take their first astronomy courses until at least the second year). The addition of this course as a requirement should therefore improve our retention as well. Because Astronomy 295 is only one credit hour per quarter and is primarily informational, we do not expect (and have not observed) any impact on the number of courses students take concurrently and therefore expect no impact on time to graduate. In fact we expect a net positive impact due to the emphasis on development of a four-year course plan during the first year.

Table 1: Summary of Credit Hour Changes

	New Pre-Reqs	New Major	Total Pre-Reqs	Total Major
Pre-2008 Total	0	0	35	66
Current	4 (CSE202)	4 (PH416)	39	70
Proposed	4	2 (A295)	39	68

The net impact of these two proposed changes (see Table above) is the reduction of two credit hours. Four credit hours are removed with the proposed elimination of the Physics 664 requirement, while two credit hours are added with the proposed addition of two instances of Astronomy 295. In the larger context of the changes in physics requirements last year, an astronomy major is presently required to take eight more credit hours than one entering the University two years ago. This proposal will decrease this to six hours, two of which are primarily informational and graded pass/fail.

Sincerely,

Paul Martini
Assistant Professor and
Director of Undergraduate Studies

TRANSMITTAL HISTORY FOR REVISION TO THE ASTRONOMY MAJOR**Committee on Curriculum and Instruction- Friday, June 12, 2009**

Excerpt from Unapproved Minutes

1. Astronomy Major Revision (Guests: Marc Pinsonneault, Bradley Peterson)
 - John Harder & Sciences Subcommittee: The Department is removing Physics 664 from the major, and adding 295 into the major. However, this 4-credit removal and 2-credit addition is a response to an increase in 2 prerequisites from Physics (8 credits total) that are already in the major. Thus, the net total is an increase of 6 credit hours. This seemed reasonable to the committee; the confusion was in the addition of 295, with 2 quarters of 1-credit courses. Students typically take Astronomy courses starting their Junior year, so the function of adding 295 is to introduce students to faculty early on for better retention. The Subcommittee thought a proper clarification was to suggest a decimalization (295.01 and 295.02) or a sequence (295 and 296), and perhaps clarification of the added and removed hours in a table with 3 columns (for current, previous, and proposed) for credit hour comparisons. [Handout brought by Astronomy.]
 - Marc Pinsonneault (MP): Astronomy majors tend to also major in Physics, so for them there is no change to the major since they were already taking those classes. These changes are geared towards Astronomy majors who are not Physics majors (those aspiring to be High School teachers for instance); this mechanics class dropped (664) was not seen as essential for that group. Astronomy 295 is a seminar course; 2 courses or meetings are effectively how many sessions needed to expose students to the faculty talking about research interests and the department. Given a seminar structured course, the issue of being 1 number, they could take it in the fall and Spring, or two Springs in a row. As long as they got to the various sessions involved it could be workable. This is a fast-changing field as well- 12 years ago a huge branch of the field was invented. So various topics in the seminar are required.
 - Brad Peterson (BP): 295 was designed to be unstructured. It depends on which faculty are around for each session. Additional sessions are added in including career paths, curriculum navigation in Astronomy & Physics (practical info), and Summer REU programs. This is intended to engage the majors in a way that was not done before, coming in their Sophomore year. Otherwise, they might feel neglected or become interested in other things/majors.
 - John Harder (JH): When would the 295 2nd session (Au, Win) be taken?
 - a. BP: Most Freshmen will take it their first year
 - b. Doug Pride: They could hear the same faculty each time?
 - c. BP: Will not object as even hearing the same faculty will be useful as far as engagement is concerned.
 - d. Jim Fredal: If they take it 2 fall quarters, what prevents them from getting the same material?
 - i. MP: It depends on how the faculty structure their presentations (what they are doing in their research). There will not be a fixed list of people; there probably will be some overlap across years.

- ii. BP: So few students will be involved in this, that we could pay attention to this population and give great advising. We might fiddle around with scheduling. Perhaps for a student in marching band, we do a small poll and see if we can change the time of the course offering. The key is this provides individual attention.
- JH: What is the approximate number of majors?
 - a. BP: 35 majors; 16 faculty and many joint appointments
- Gene Mumy: If they took exactly the same course, same faculty same topics, that might happen. What is the advantage?
 - a. BP: This engages them regardless.
 - b. MP: Normal progression is that they take it their Freshman year twice. The only people who might fall into that scenario just described are those with scheduling conflicts, a very small percentage.
 - c. Caroline Breitenberger: Also, what about students who don't choose their major their 1st quarter?
- CB: I think it would be helpful to see the prerequisite hours, the major hours, and Physics hours. Perhaps an amended table, showing a change in prerequisites not within the major. Prerequisites increased from 35→43; major from 66→66→64.
 - a. MP: Prerequisites for Astronomy are in that column.
 - b. CB: We want all prerequisites needed for the major, or a separate column
 - c. BP: Some Physics prerequisites are pre-pre-requisites.
 - d. MP: Bookkeeping is to have that in total, rather than meted out
 - e. CB: For those without knowledge of the structure of the major, it would help to split those up.
 - f. **MP: Yes, we can create a distinct column**
- Letter from Subcommittee serves as motion to approve; 2nd - Krissek
- **UNANIMOUSLY APPROVED with contingency to submit a revised table**

**Social, Behavioral, Biological, Mathematical & Physical Sciences CCI Subcommittee-
Tuesday, June 9, 2009**

Excerpt from Unapproved Minutes

3. Astronomy Major revision

Primary reviewers: Caroline & Doug

- A two-fold change to major; the issues are not related.
- Rationale for withdrawal of Physics 664 from major requirements: CSE 202 and Physics 416 were approved last year to be added as pre-reqs to certain Physics courses. These additions affected Astronomy major, which requires many Physics courses. Astronomy does not wish to eliminate the courses that the pre-requisite changes affected, but wishes to address this increase in credit hours.
- Request to drop one physics course from Astronomy Major requirement (Physics 664) to reduce impact of increase in credit hours. This course has a different focus than the other physics courses that carry the new pre-requisites, but is not as crucial to the major. Besides, many students take 664 anyway as double majors with physics, therefore the impact would be fairly low.

- Rationale for addition of Astron 295: This is a one-credit course required to be taken twice: Why take course two times? Retention? Will help students connect with faculty in Astronomy while they are taking many pre-reqs that are not in Astronomy and will help formalize degree planning process.
- **Please clarify why 295 is a 1-credit course to be taken twice (during recommended quarters) rather than a decimalized course (295.01 and 295.02); or 295 and 296? How can they ensure that the content will not be similar?**
- Explanation of 295 as retention based and advising based course that allows students exposure to many faculty early on
- Department is proposing to drop one 4-credit course, but two 4-credit pre-reqs were added beyond their control to required course. Also, adding two credits in the form of 295 better prepares students and helps with retention. This results in a net decrease in 2 credit hours required within the major, but an actual net 6 credit-hour increase for students if one adds back in the increase in pre-req credits.
- What are hours required in major? Currently 79 not including pre-reqs.
- **Please add to the proposal a table with 3 columns reflecting these credit hour comparisons 1) Before Physics changes to pre-reqs (pre-req hours and hours within major), 2) Current (pre-req hours and hours within major), and 3) proposed changes (pre-req hours and hours within major).** This will be very helpful for committees as proposal moves forward.

Motion- Approved with Contingencies in bold above Soundarajan, 2nd Breitenberger
UNANIMOUSLY APPROVED

Mathematical and Physical Sciences Curriculum Committee- Wednesday, May 27, 2009

Excerpt from Approved Minutes

5. Astronomy Major Revision

- Physics added 2 requirements last year that are prereqs for classes Astronomy majors had to take, adding 8 more credit hours to their schedules. 416 became a prereq for some upper level courses, making it a requirement. CSE 202 as well.
- Looking at other required Astronomy classes, the Department chose to remove Physics 664, (thus 4 credits from the major) leaving only an addition of 4 credits from these original changes
- About 50% of Astron majors will be affected, since 50% of other majors are also Physics majors and they will have to take 416 anyway.
- Adding Astronomy 295 (2 credit hours) (see last week's minutes)
 - a. This can be used for 2nd year students as well who decide to become Astronomy majors- the bulk of the material is research seminar-based. There is some logistical information with scheduling and research opportunities.
- This would allow students with 17 freshmen hours to drop a 5 hour class to maintain themselves at a full-time 12 hours
- Offered late afternoon on Tuesdays to minimize student schedule conflicts
- Total of these 2 changes equals a 2 hour credit reduction

- a. **Because of changes that the Physics program made and the changes in Astronomy to mitigate them, the overall impact is a net increase of 6 credit hours**
- **Add statement that dual majors will not be affected, and it will help Astronomy majors**
 - Pinsonneault, Craigmile- **UNANIMOUSLY APPROVED contingent upon the bolded items above**

Mathematical and Physical Sciences Curriculum Committee- Wednesday, April 22, 2009

Excerpt from Approved Minutes

3. Astronomy 295
- Previously 294- professors rotate, coming in and talk about their research to freshmen, giving them a sense of Astronomy; take 2 quarters; professors enjoy doing so
 - Making this course a required course in the major will trigger a major revision
 - A relatively minor change, but could provide a rationale for including this in majors: does not affect time to graduation (by adding hours), and with positive feedback is a great addition to the program; no other changes
 - Change repeatable to 2
 - Perhaps keep at 4, but require 2 credits of the course
 - Interested in allowing non-majors to take as well
 - Like a freshman seminar course; Physics does a 2nd year course similar to this; there is a research day, career things
 - Allow them to take Physics first
 - Not making it 2 course numbers because it probably won't make a big difference
 - Will add this as a group studies form to get through for Autumn 2009 because of OAA deadlines
 - Will contact Kate Hallihan in CAO and Dave Andereck to discuss possible major revision
 - Provided with a major approval rationale, is the committee otherwise alright with this course? Yes, as a non-required course
 - Could it be approved and placed as a prereq and not trigger revision?
- Craigmile, Solomon- **UNANIMOUSLY APPROVED as a non-required course (CAO to uncheck the box)**