Department of Physics Graduate Program (PhD and MS)
January 2015, Midterm Update for Five Year Plan (June 2012 - 2017)

We present the salient features of our 5 year plan in *italics* and for each item present its mid-term status in **bold**.

Overview
Our overall goals over the next five years are to (1) increase the quality of PhD students in our program; (2) improve the financial support for our students, (3) maximize efficiency in the delivery of our coursework, both from the students' point of view and from the point of view of utilization of faculty resources; (4) restructure our RA/TA funding model to account for the new tuition fellowship environment. The following plan is organized into two sections. The first section is a list of concrete actions we will take over the next five years to improve our program. After each item we identify which of the core areas (Recruitment, Mentoring, Management, Funding) the item is intended to address. The second section is a list of metrics which we will use to assess our progress.

Action Items
• Each research group has made a high quality brochure which can be distributed to potential students and also appears electronically on our website. These brochures will be reviewed and updated as needed. (Impact: Recruitment)
Status: The CASS brochure has been rejuvenated and is now up to date ready for production. Ongoing action is to rejuvenate the others.

• The department is working with graduate students to enable them to put a (research-based) profile both on our department website and in Digital Commons. Students have informed us that this is a very important method for catching a prospective student's interest. (Impact: Recruitment)
Status: The Physics Department web page has continually been updated with EVENT and SUCCESS information as well as with information related to assessment. Current action is to review our department's assessment documentation as well as grad student related links. Currently 22 graduate students have Digital Commons sites linked to the department website, only the two most recent grad students have no content in them but they are working on content. Note, our graduate population is not significantly different from this number and only two have left USU.

• The Physics Department website has been totally overhauled and will continue to be fine tuned with the principal goal of enhancing its recruitment impact. (Impact: Recruitment)
Status: Continue regular and updates maintenance. Continue updating to display assessment information.

• We have begun bringing our most promising graduate student applicants for visits to the department. We feel such visits improve our graduate recruiting efforts on two fronts. First, while we regularly get applications from students who seem of high quality and a good match for our programs, often we find we simply cannot compete with comparable schools if only because of our relatively low TA stipends. So we feel we must do something extra for these kinds of students. Second, we find our most successful students are those who come here with their research interests already well-matched with those of our faculty. Visits to USU help us align the students' interests with those of the faculty. Such visits also provide a good way to filter out the students who are not a

good match with our program. (Impact: Recruitment, Mentoring, Management)
Status: We have been bringing to campus up to 6 potential grad students each year. But this is not an optimized activity. The coordination between the interested parties: future grad students, existing grad students, and faculty is not happening at the expected level. Action: next recruitment drive (January-February 2015) ensure buy-in from faculty and graduate students at USU Physics.

• Using departmental F&A money we have initiated an effective 25% increase in the TA stipend for incoming students. This enhanced stipend lasts for 2 years. This increase should take us from nearly the bottom of our peer group and put us somewhere near the lower middle in TA funding, at least for incoming students. The stipend increase is advertised to the students as a Research Stipend and is given in conjunction with new research-related curricular requirements for our incoming students (see below). This research stipend lasts for the first two years of a student's time here, after which the stipend reduces to its current, lower value. The idea is that, in light of our new curriculum structure, a student should be moving into an RA after 2 years and/or supplementing his/her support with fellowships and scholarships. (Impact: Recruitment, Management
Status: Analytics supplied by the Vice President for Researches office shows that over a three year period our monthly average graduate student stipend has been increasing. The fall monthly averages for the department of Physics are:
Fall 2011: $1,688
Fall 2012: $1,794
Fall 2013: $1,832
Action: keep encouraging faculty to write graduate student stipends into proposals.

• The new graduate course curriculum (currently being implemented) consists of a rigorous 2 year sequence of courses which all students must take. At the end, all Physics Department course requirements will be satisfied. With a universal two year coursework program we maintain adequate class sizes, we provide an efficient means to evaluate a student's abilities to complete our program, and we better prepare our students for research. This also relieves a perennial headache of finding the best match of faculty resources to the (previously) fluctuating student demand for various courses. Besides the usual core courses needed to give depth and breadth to potential PhDs, the new physics graduate curriculum includes two new, less traditional types of courses. These courses are meant to facilitate the student's movement into PhD research and to provide valuable skills needed by our students to be competitive for funding before and after they graduate. The first course, entitled "Graduate Research in Physics", requires a student to collaborate with one or more faculty mentors on a relatively low-level, introductory research experience. The second course, entitled "The Profession of Physics", will be a one-credit course that addresses a number of timely topics for the graduate students. It shall be taught each fall semester. These topics will include (i) departmental areas of research, (ii) writing of proposals and fellowship applications, and (iii) research ethics (which is intended to satisfy federal mandates), and (iv) career paths in physics. As this course requires each student to write a proposal for, e.g., NSF fellowship funding, it is hoped that this course will lead to enhanced financial support for our students. (Impact: Mentoring, Management, Funding
Status: This curriculum plan was created one year prior to an unforeseen major campus-wide change on graduate student tuition support, which has led to several adjustments to the semester credit expectations that are still under way. Also, "The Profession of Physics" has been discontinued at this time, in part due to the tuition issue, and in part because its syllabus was duplicating other required

graduate student courses. Notable successes which can be attributed partially to this course include one NSF graduate fellowship and one NSF graduate fellowship honorable mention. Both indicating our grad students can write, with suitable coaching, winning proposals. We changed the credit requirements for the graduate degrees. Currently the MS degree requires 30 SCH and the PhD requires 72 SCH (42 SCH after the MS).

• Graduate students now elect a student representative to the faculty. This student attends faculty meetings (where appropriate) and is a principal contact for formal faculty student interactions. (Impact: Mentoring, Management)

Status: The student representative also actively coordinates grad students when needed for new faculty visits, new grad student visits, grad education (Digital Commons), and the monthly grad student faculty socials/business meetings.

• We have initiated a regular series of graduate student-faculty meetings. These monthly meetings, administered by the Department Head and Assistant Head, are open to all faculty and graduate students. The agenda of the meeting is worked out in advance via faculty interaction with the student representative. (Impact: Mentoring, Management)

Status: This strategy worked initially but was in danger of petering out. It was rejuvenated in fall 2014. The lesson learned is that department head must lead enthusiastically to get both faculty and grad student attendance. In fall 2014 we had 3 meetings at which between 50 and 75% attendance was achieved. Note about 15% of grad students have teaching (TA) assignments at that time.

• We will continue to employ our Graduate Student Tracking committee. This committee, which consists of a representative from each of the department's principal research areas, meets annually with all graduate students to assess their progress through our system and give help or guidance as needed. In addition, this committee now meets with all incoming graduate students to make sure they understand our system and to give them timely advice on how best to proceed. (Impact: Mentoring, Management)

Status: This committee works very well. It keeps all grad students on track, reducing "surprises", and providing graduate students a balanced input on their progress. Action is to keep it going as is. The addition of a brief meeting with all incoming students in the Fall has worked well and will be continued.

• Our current RA pool supports 10-12 students. We will be working with faculty researchers to increase this pool to a target of 15. (Impact: Funding)

Status: Currently it appears that 13 of our 26 graduate students are being supported by the usual university-provided Graduate Teaching Assistantships students with 13 students supported via non-TA sources. At best, the RA support for graduate students appears to be static. Given the demographics of the department faculty this is not too surprising. If/when new faculty are hired this situation should improve dramatically.

• We will try to identify a faculty member who can investigate (if not apply for and oversee) training grants such as IGERT. While we feel successfully acquiring and administering such grants is something of a long shot, if an enthusiastic faculty overseer can be identified, this would be a significant enhancement to our graduate program. (Impact: Mentoring, Funding)

Status: If the new cluster hires in mathematical physics could be successfully completed, this idea would be implemented via a Research Training Group proposal submitted to the National Science Foundation by the Math-Physics research group, perhaps as early as Summer 2015. Currently, the Department of Mathematics and Statistics has hired its team member. So far, spousal accommodation issues have thwarted attempts by the Department of Physics to make its hire thus far. Without success in building the physics side of this cluster hire it is likely the Research Training Group strategy will fail to materialize.

• We will implement exit interviews with all graduate students as they finish their degrees. We will begin following up these with annual emails to our previous graduate students. This allows us to collect valuable assessment data on student attitudes toward the program, on any specific problems that arise, and on placement of our students in the job market. (Impact: Recruitment, Mentoring, Management)
Status: Department Head needs to initiate this.

• We are asking all researchers whose grant proposal requests a full-time (half-time) graduate student to also request 12 credits of in-state tuition for two semesters. Part- time graduate students would have the tuition support request pro-rated accordingly. (Impact: Funding)
Status: This is being done. But the current demographics of the department would seem to indicate that no significant change can be expected at this time. Also, currently there is an issue as to whether 3 or 6 credits per semester is the minimum credit level needed, especially when all course work has been completed. Action here is to await resolution from the graduate school.

• We are exploring the possibility of offering large, general education classes online via RCDE. The relevance to the graduate program is threefold. First, such classes provide unique teaching opportunities for graduate students. Second, such classes provide excellent opportunities for employing TAs. Third, such classes generate revenue for the department which can be used for TA stipends. Thus these classes generate much-needed revenue to support our graduate students when they are not engaged by an RA. Our first test class (PHYS 3030, The Universe) is being offered this summer and looks to be successful. (Impact: Funding, Mentoring)
Status: This idea has had brilliant success thus far. We have created one class, "The Universe", a 3000 level general education class. At this point we have had two TA's teach this class. Its enrollment increases each semester, with Spring 2015 having an enrollment of greater than 150. In the 2014 – 2015 school year about $8000 from this RCDE online course will be going to help support Physics department graduate student tuition needs.

Assessment Metrics:

• We will begin systematic statistical monitoring of GRE scores and GPAs of incoming graduate students.
Status:

Average	2013	2014		
GPA	3.6	3.3		
GRE – Verbal	78.6	74.3		
GRE – quantitative	82.7	81		
GRE - analytical	56.8	50.5		

• *We will systematize tracking of all our graduates with regard to their subsequent career. Currently this has been done in a somewhat informal, ad hoc fashion.*
Status: We have begun assembling a database which keeps track of student outcomes.

• *Increase RA pool to 15.*
Status: So far no change.

• *We will track the diversity of our graduate population and compare with the national average.*
Status: We are compiling these data. Currently 6/26 graduate students are female, while 1/26 graduate students is Native American. We are still attempting to find corresponding national figures for physics graduate programs.

• *With our new curriculum in place, we would like to verify that we are averaging a minimum of 5 students per class.*
Status:

	2011	2012	2013	2014		
Average students/class	6.3	7.7	9.3	6.1		

• *We will formally track time for transition from TA to RA; the goal being 2 years on average.*
Status: No students have made this transition as yet, so nothing to report here.

• *We will formally track graduate average stipends as a function of time to confirm that the slope is positive and approaching national mean values.*
Status: Monthly stipend average:
Fall 2011: $1,688
Fall 2012: $1,794
Fall 2014: $1,832

* *Tuition fellowship support from the department administration and from research grants should adequately complement support from the university.*
Status: Tuition support by source
2013-14: $102, 294 (VPR); 51, 412 (Physics)
2014-15: $ 56, 884 (VPR); 24, 869 (Physics)

* **ADDED: Student activity – awards, presentations, publications**

	2012	2013	2014		
Awards	19	17	4		
Conference Presentations	44	35	25		
Publications	16	16	20		