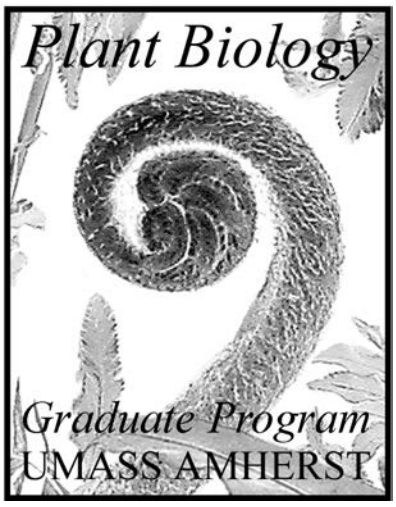
Academic Requirements, Policies and Procedures



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Graduate Studies in Plant Biology

The Plant Biology Graduate Program (PB Program) faculty represent four departments including Biochemistry and Molecular Biology, Biology, Environmental Conservation and Stockbridge School of Agriculture at UMass and associated Five College institutions. Faculty research interests encompass a variety of plant science disciplines including cell biology and physiology, biochemistry and metabolism, genetics and evolution, and environmental, ecological and integrative plant biology. An emphasis is placed on multidisciplinary research with approaches that range from practical to theoretical.

The Program offers both Ph.D. and Masters of Science degrees. A detailed description of the degree requirements is set forth below.

The Ph.D. Degree Program in Plant Biology

I. Course Requirements for the Ph.D. Degree

A. General Guidelines

Doctoral degree candidates must comply with the Graduate School requirement that the equivalent of at least one continuous academic year of full-time graduate work (9 credits per semester) must be spent in residence at the University of Massachusetts, Amherst.

A student must earn 15 credits in formal course work. This requirement must be satisfied by completing the one-year PB core course curriculum (PB I and PB II) plus additional program-related elective courses such as those listed below. A grade of B- or better must be earned in the PB core courses. In the remaining courses that a student is offering to satisfy degree requirements, a minimum standard for satisfactory work is a 3.0 grade point average. A student who in any two semesters, consecutive or otherwise, has semester averages of below 2.8 is subject to dismissal. The typical academic load for first year PhD students in PB is: First semester: PB I (3 credits); PB related elective course (3 credits); Research rotation (2 credits); Seminar (1 credit). Second semester: PB II (2 credits); PB related elective course (3 credits); Rotation (2 credits); Seminar (1 credit); Journal club (1 credit).

B. Program-related elective courses for the Plant Biology Graduate Program

BIOLOGY 891PB	PB I Topics in Plant Biology Research (fall)
BIOCHEM 694A	PB II Topics in Plant Biology Research (spring)
BIOCHEM 623	Advanced General Biochemistry
BIOLOGY 510	Plant Physiology
BIOLOGY 514	Population Genetics
BIOLOGY 559	Cellular and Molecular Biology II
BIOLOGY 583	Advanced Genetics
BIOLOGY 621	Topics in Plant Ecology
BIOLOGY 697	Plant Cell Biology
MOLCLBIO 641	Advanced Cellular Biology

MOLCLBIO 642	Advanced Molecular Biology
STOCKSCH 505	General Plant Pathology
STOCKSCH 510	Mgt & Ecology of Plant Diseases
STOCKSCH 523	Plant Stress Physiology
STOCKSCH 525	Mycology
STOCKSCH 535	Diagnostic Plant Pathology
STOCKSCH 555	Urban Plant Biology
STOCKSCH 575	Environ. Soil Chemistry
STOCKSCH 597A	Phyto/Bioremediation
STOCKSCH 661	Intermediate Biometry

Other courses may be substituted as PB related electives with permission of the Graduate Operations Committee (GOC).

C. Journal clubs

Participation in one journal club is required each semester, not including summer. The exception is the first semester of the first year. Students may enroll in a journal club offered by another department or graduate program. Note that some journal clubs require consent of the instructor to enroll.

D. Seminars

Each semester, the Program will sponsor a seminar series. The seminars are held on Thursdays at 4:00 PM and feature a research talk from an invited speaker. The speakers for the fall series are generally from the Plant Biology Program. The spring series features invited speakers on current issues in Plant Biology research. For the spring series, graduate students will have lunch with the speaker on the day of the seminar to discuss the topic. All students are required to attend the seminars and participate in the discussion sessions and should, therefore, register for 1 credit of BIOLOGY 891B (Seminar Series).

II. Guidance Committee

The Guidance Committee of entering students (both PhD and MS) will be the Graduate Operations Committee (GOC). The Guidance Committee's role will be to help the student with potential course offerings, potential rotation mentors, and anything else relating to academics. The GOC will be constituted to reflect the balance of disciplinary interests of the Plant Biology Program and will serve as an advisory committee for the student until a Dissertation Committee has been assembled. Each student will meet with his/her Guidance Committee at least once each semester to review progress. Following the meeting, the student will summarize the decisions made and will submit the summary to the Plant Biology Program Manager for placement in his/her file.

III. Laboratory Rotations for Non-targeted Ph.D. Students

Entering PB (PhD) students (unless targeted) will do two, four-month research rotations. The first rotation will run from Oct – Jan, and the second Feb – May. The student is expected to join a lab by their first summer. In exceptional circumstances (and with approval from GOC), the student may undertake a third (three-month) research rotation (June- August). At the conclusion of the second laboratory rotation, the student will select a laboratory in which to complete their dissertation research and obtain approval from the PB faculty member to work in their laboratory.

The purpose of the laboratory rotations is to attain focused, in-depth research experience, and to learn first-hand about working with potential advisors and their laboratories. Expectations regarding time commitment (hours per week) and expected activities/accomplishments during the rotation will be decided jointly by the faculty member and student. The faculty member and student will complete a Practicum Agreement Form which will provide the following information: 1) objectives and planned activities; and 2) evaluation criteria. The student will submit the completed Practicum Agreement Form to the Graduate Program Director. The Graduate Program Director may request changes in the Practicum Agreement Form if the objectives and/or expectations are not clear. The two rotations must occur in different laboratories. Students should register for two credits of BIOLOGY 698A (Practicum) for each rotation.

A. Fall Semester Rotation

The fall semester rotation will last for approximately 14 weeks, commencing the first week of October and continuing until the end of Wintersession. During the month of September, the PB program seminar will feature brief presentations by PB faculty, aimed partially at helping students choose rotation laboratories. Students must select a laboratory for the fall semester rotation by September 30th. The Practicum Agreement Form must be completed and returned to the Graduate Program Director by the end of the first week of October.

B. Spring Semester Rotation

The spring semester rotation will commence the first week of classes in Spring semester and will continue to the end of the semester (approximately 14 weeks). The Practicum Agreement Form must be completed and returned to the Graduate Program Director by the end of the first week of classes.

C. Summer Semester Rotation

Students entering the PB program in January will complete the first laboratory rotation in spring semester and the second laboratory rotation during Summer session. The summer session rotation will commence the first week of June and continue for approximately 12 weeks. The Practicum Agreement Form must be completed and returned to the Graduate Program Director by the end of the first week in June.

IV. Targeted Ph.D. Students

If a student has been in correspondence with an individual faculty member prior to submission of an application for admission and if the student has had substantial prior research experience the student can be targeted to the faculty member's laboratory and is not required to participate in rotations. Typically, a targeted student will have a MS degree or the equivalent. A faculty member targeting a student is expected to demonstrate that he/she is able to provide funding for at least two semesters and will be responsible for further funding, during the time that the student remains in his/her laboratory. All targeted students must be admitted by the Admissions Committee using criteria identical to those used for other students.

V. Teaching Requirement

All Ph.D. students, whether targeted or not, are required to complete two semesters of teaching while supported by a teaching assistantship (TA). The timing of the teaching requirement for targeted students will be determined by the availability of PB Teaching Assistantships.

VI. Preliminary PhD Comprehensive Examination

The Preliminary Comprehensive Examination will consist of two parts: A) passing of the PB first-year core curriculum (PB I and PB II) with a grade of B- or better and B) successfully defending an original research proposal related to the student's planned dissertation project.

A. PB first-year core courses

All first year students (MS and PhD) will enroll in PB I (currently BIOCHEM 690A) in the fall and PhD students will enroll in PB II (currently BIOCHEM 690A) in the spring. PB I is a three-credit-hour course, in which students have lectures from various faculty members of PB. Each faculty presents material for one week of the course and each sets the students an exam question. The faculty member will lecture in depth on a topic in plant biology. In a semester, students will hear from many but not all PB faculty. In PB II, a two-credit-hour course, students will learn how to write a grant proposal. Based on an abstract from a funded proposal, students will write a proposal implicit in the abstract. This course also includes discussion on ethical conduct in scientific research. For PB I, the course coordinator establishes the lecturing roster and collects the grades. For PB II, the coordinator runs the class itself.

A student passing both PB I and PB II (with a grade of B- or better) will be considered to have passed part one of their comprehensive exam. A student failing PB I will be given a chance to retake the exam during spring semester, presumably in the form of a typical oral comprehensive exam, as arranged by the Graduate Program Director (GPD). A student failing PB II will be given a chance to retake the exam during the summer,

presumably in the form of a proposal writing exercise, as arranged by the GPD. Students that fail the second examinations will be dismissed from the Ph.D. program, and the matter will be presented to the Graduate Operations Committee to determine options available to the student.

B. Defense of original research proposal

1. General Comments

By Feb of the second semester of the second year, the PhD student will convene their Dissertation Committee. Their mentor will serve in an advisory capacity to the rest of the committee (see below for more information about this committee). The Dissertation Committee will administer part two of the comprehensive exam. This exam will be a defense of an original research proposal relating to the student's planned dissertation project. The student will write up a proposed set of experiments, including methods, potential outcomes, an introduction where the questions at stake are asked, a discussion where potential results are interpreted and potential impact on the field predicted, and a comprehensive bibliography. The student will give copies of the proposal to committee members no less than two weeks before the exam and during the exam will present the proposal orally and handle questions. In both written and oral portions, the student will be expected to demonstrate mastery of the relevant literature and concepts. The exam should take place before the end of spring semester.

The defense is designed to test the competence of the doctoral candidate in skills not evaluated by previous examinations. The skills to be tested include:

- the ability to become expert in a limited area of the current research literature,
- to conceive an original research project,
- to apply newly learned tools to the investigation,
- to envision the possible results of planned experiments,
- to set criteria by which the data and results will be assessed,
- and to establish reasonable priorities among possible approaches to the problem.

2. Detailed Guidelines

The cover page of the proposal should contain the title, the student's name, the date, and the statement: "A research proposal submitted to the Plant Biology Graduate Program, University of Massachusetts, Amherst, in partial fulfillment of the requirements for the Preliminary Comprehensive Examination."

The proposal should include

(a) a review of the background and rationale of the problem with particular concern for recent developments in the field and

(b) a simple, concise statement of the research problem or question that the student is proposing to investigate.

(c) a lucid statement of one or more hypotheses the student has developed to investigate the problem and

(d) a moderately detailed statement of the rationale and methodology of the experiments to be carried out, an outline of the results anticipated, and a description of how the results will be interpreted.

The bibliography should provide complete citations (all authors, year, title, journal, volume, first and last page) for all cited references.

Each member of the Exam Committee will receive a copy of the proposal from the candidate, at least 14 calendar days prior to the date of the examination. Members of the Committee have up until 5 calendar days before the scheduled examination to move for rejection of the proposal as submitted. To do so, the committee members will contact the student's mentor who, in consultation with all committee members, will decide what steps are necessary in order to proceed with the examination.

The candidate will defend his/her research proposal before the Exam Committee. In general, the candidate will be expected to open the examination with a formal presentation of approximately 30 minutes duration, outlining the salient points of the proposal. During the defense, the student must show that the experimental approach proposed is scientifically valid and that the techniques to be employed will yield useful and interpretable information. The remainder of the examination will be devoted to the discussion of questions posed by individual committee members. At the conclusion of the examination the student will leave the room. The student should remain available to the committee as it deliberates and votes.

An evaluation of the candidate's performance will result in a "Pass", "Conditional Pass", or "Fail". Immediately following the examination, the Chair of the Exam Committee will communicate all comments and concerns to the candidate, and will also transmit, in writing, the results of the Examination and all recommendations of the Committee ("Pass", "Conditional Pass", or "Fail") to the GPD.

A "Conditional Pass" will be accompanied by specific stipulations to the student for further work. Students who are judged to have failed the examination will receive one additional opportunity to take the examination. The second examination must be passed within six months of the first examination. Students who fail the second examination will be dismissed from the PhD program.

Immediately following the examination, the Chair of the Exam Committee will communicate all comments and concerns to the candidate, and will also transmit, in writing, the results of the Examination and all recommendations of the Committee ("Pass", "Conditional Pass", or "Fail") to the GPD.

VII. Dissertation

A. Dissertation Committee

Students must assemble a Dissertation Committee prior to their defense of their research proposal in the fourth semester of study. The committee will consist of the Research Advisor, who will serve as the chair for the committee, plus three additional

members. Two of the additional members must be faculty in the PB Program, while the third member must be outside of the PB Program. This outside member may be a graduate faculty member in another program, or an expert from outside the University of Massachusetts, Amherst. The names of the committee members must be submitted to the PB office and subsequently approved by the Graduate Operations Committee and the Graduate School. It is the responsibility of the Dissertation Committee to monitor the student's research and progress toward the Ph.D. degree. The Dissertation Committee shall meet with the student at least once per year to discuss the course of the research and will file a brief report with the GPD. It is the responsibility of the student to arrange these annual meetings.

B. Dissertation Prospectus

A student is required to present a Dissertation Prospectus to his/her Dissertation Committee and receive approval of its contents by the end of the sixth semester of study. The prospectus must be submitted to the Graduate School at least seven months prior to the date of the Final Doctoral Oral Examination and must be accompanied by a cover sheet signed by each member of the Dissertation Committee (See Sample Cover Sheet/Signature Page in the Graduate Student Handbook). A copy of the prospectus must be placed in the student's file in the PB office.

C. Final Doctoral Oral Examination (Dissertation Defense)

The format of the Ph.D. dissertation document is set by the Graduate School. (Refer to the student dissertation/thesis guidelines on the UMass Graduate School It is the responsibility of the student to learn about and follow the rules governing the dissertation format. The student must deliver his/her completed dissertation to the Dissertation Committee no later than four weeks before the Final Oral Examination. The time and place of the Final Oral Examination must be publicly announced by the Graduate School; information as to the time and place of the examination must, therefore, be submitted to the Graduate School by the Graduate Program Director at least three weeks prior to the examination.

The Final Oral Examination will consist of two parts. The student will first present an open seminar on his/her research results. The seminar will be followed by questioning by the Dissertation Committee. The seminar and the questioning by the committee can take place on the same day or on different days. The student will then submit the "Doctoral degree eligibility form to the Graduate Program Director for submission to the Graduate School.

VIII. Evaluation of Research

To be successful at research, a student must perform well in a number of areas.

Beginning with the one-semester rotation, a student's performance will be assessed each semester as described in Appendix C, pp. 15-16. The evaluation will be placed in the student's file in the PB office; a copy will be sent to the student.

Students with "Poor" evaluations for two consecutive semesters will lose their stipends (TA or RA) and be terminated from the Program.

IX. Period of Study

It is expected that students will complete the Ph.D. degree in four to five years. Funding (TA/RA) will be guaranteed for up to five years contingent upon satisfactory progress towards the Ph.D. degree. Funding beyond five years may be provided based on approval by the Dissertation Committee and the PB Director.

X. Statute of Limitations

The Graduate School has established a six-year Statute of Limitations for the Ph.D. degree.

The Master's Degree Program in Plant Biology

I. Introduction

The Master of Science degree program in Plant Biology is designed to accommodate students of diverse academic backgrounds and career plans. All students enrolled in the Master's program are required to perform independent research and prepare a thesis. The PB Program does not offer a non-thesis option, except for the Five Year MS Program open only to Five College undergraduates.

II. Requirements for the Master of Science Degree

A. A minimum of thirty graduate credits obtained as follows:

1. Completion of at least three 600-level Plant Biology core courses (see page 2 for course listings)
2. Six (minimum) to ten (maximum) credits of Master's Thesis (BIOLOGY 699)
3. Two or more credits from PB journal clubs (1-2 cr. per semester)
4. Four credits from Plant Biology seminars and discussions (1 credit per semester – see pg. 3)
5. The remaining graduate credits are elective.

B. Terms and Conditions

Graduate credit is normally given for classes at the 500 level or higher. Graduate credit may be awarded for courses at the 400 level if approved by the Guidance/Thesis Committee. No course may be taken on a Pass/Fail basis except for Master's Thesis (BIOLOGY 699). In the courses that a student is offering to satisfy degree requirements, a minimum standard for satisfactory work is a 3.0 average. A student who in any two semesters, consecutive or otherwise, has semester averages of below 2.8 is subject to academic dismissal. No more than six credits of Independent Study can be applied towards the M.S. degree. All coursework is subject to approval by the Guidance/Thesis Committee.

III. Guidance Committee

The Guidance Committee of entering students (both PhD and MS) will be the GOC. The Guidance Committee's role will be to help the student with potential course offerings, potential rotation mentors, and anything else relating to academics. The GOC will be constituted to reflect the balance of disciplinary interests of the first year class and will serve as an advisory committee for the student until a Thesis Committee has been assembled. A student will meet with his/her Guidance Committee at least once each semester to review progress. Following the meeting, the student will summarize the decisions made and will submit the summary for placement in his/her file.

IV. Thesis Advisor

A. It is the primary responsibility of the M.S. candidate to select a Thesis Advisor. The selection of the Thesis Advisor should be made by the end of the first semester. A student who wishes to have a particular faculty member serve as his/her Thesis Advisor should inform the Graduate Program Director as to his/her preference. If the candidate desires, (s)he can state his/her choice on the graduate school application.

B. The candidate's selection for Thesis Advisor must be approved by the Graduate Operations Committee. All individuals serving as Thesis Advisors must be members of the Graduate Faculty of the University of Massachusetts, Amherst (which includes five college faculty), **and** members of the PB Program.

C. Should a candidate's educational objectives change, that individual may make a written request to the Graduate Operations Committee for reassignment to another Thesis Advisor.

V. Thesis Committee

A. **Purpose.** The Thesis Committee 1) approves the student's choice of courses, 2) evaluates and approves the thesis outline, 3) guides and monitors progress of the thesis project, and 4) conducts the Defense of Thesis Examination.

B. **Membership.** The Thesis Committee will consist of the Thesis Advisor, who serves as the Chair, and two additional members. One of the latter must be from the PB Program, while the other member may be either a member of the Program, or a Graduate Faculty member in another program or department at the University of Massachusetts, Amherst, or an expert from outside the University of Massachusetts, Amherst. Membership of the committee must be approved by the Graduate Operations Committee and the Graduate School.

C. **Timetable.** Within two semesters of initiation of the Master's degree program, the Graduate Program Director, upon recommendation of the Thesis Advisor, shall recommend to the Dean of The Graduate School the appointment of the Thesis Committee. It is the responsibility of the Thesis Advisor to ensure that the Thesis Committee meets at least once per semester as long as the student is enrolled in the M.S. program. Following each meeting, the student must prepare a summary of the decisions made, have his/her Thesis Advisor sign it, and submit it to the Graduate Program Director for placement in his/her file.

VI. Thesis Outline and Thesis

A. At the beginning of the third semester of study, the candidate shall prepare a Thesis outline and obtain approval of the outline from the Thesis Committee. The Thesis Advisor will inform the Graduate Program Director when the thesis outline has been approved. The thesis outline, signed by all the members of the thesis committee (see Sample Cover Sheet/Signature Page in the Graduate School Handbook), must be submitted to the Graduate Records Office at least four months prior to the Defense of

Thesis Examination. A copy of the outline must be placed in the student's file in the PB office.

B. It is expected that the thesis will be of sufficient quality, originality, and substance as to warrant its publication in one or more peer-reviewed scientific journals. A Master's Thesis must be typed in a particular style and format (refer to the Graduate School website- -http://www.umass.edu/gradschool/thesis/TDindex.html) or it may be in the form of published (or ready-to-publish) papers with an expanded literature review and section for literature citations. In the latter case, pertinent data not included in the body of the thesis should be incorporated into one or more appendices. The Thesis Committee will determine the exact format of the thesis.

VII. Examination of M.S. Candidates

A. The candidate is expected to provide members of his/her Thesis Committee with a copy of the final draft of the thesis at least two weeks before the Defense of Thesis Examination. The Thesis Advisor shall notify all PB faculty of the date, time, and place of the Final Examination at least one week in advance of the event.

B. The Defense of Thesis Examination will be held in two parts. The candidate will present an open seminar on his/her research results followed by questioning by the Thesis Committee. The seminar and questioning by the committee can, if desired, take place on the same day. The candidate should discuss expectations with each Thesis Committee member prior to the examination. The examination is open to all faculty.

C. Once the faculty have examined the candidate, the Thesis Committee will adjourn and vote on the candidate's performance. Only members of the Thesis Committee are eligible to vote. The recommendation of a majority of the Thesis Committee shall be required to pass the examination. Upon successful completion of the Defense of Thesis Examination and approval of the thesis by the Thesis Committee (approval is denoted by signatures), the Graduate Program Director will submit the result of the Examination and a "Certification of Eligibility for a Master's Degree" form to the Graduate School. The Thesis Advisor and candidate must provide the Graduate Program Director with the requisite data to complete the certification.

VIII. Period of Study

It is expected that students will complete the M.S. degree within two years. Funding will be guaranteed for up to two years contingent upon satisfactory progress towards the M.S. degree. Funding beyond two years may be provided in certain circumstances; the approval of the Thesis Committee and the PB Director will be required.

IX. Statute of Limitations

The Graduate School has established a three-year Statute of Limitations for the M.S. degree.

APPENDIX A

TYPICAL SCHEDULE FOR PH.D. CANDIDATES (NON-TARGETED)

First Semester

- Plant Biology core survey course (PB I)
- One or two PB program-related elective courses
- fall semester rotation chosen by September 30th
- PB seminars and discussions

Wintersession

- fall semester rotation continues to end of wintersession

Second Semester

- Plant Biology core proposal writing course (PB II)
- one or two PB program-related elective courses
- spring semester rotation
- PB seminars and discussions
- journal club
- Preliminary comprehensive exam (part I) completed with grade of B- or better in PB core courses

Third Semester

- One PB program-related course
- journal club
- PB seminars and discussions

Fourth Semester

- journal club
- PB seminars and discussions
- Form dissertation committee
- Preliminary comprehensive exam (part II) : Defense of original research proposal on planned dissertation project completed

Fifth Semester and after

- Dissertation Prospectus submitted to Graduate School by end sixth semester (no later than seven months prior to defending)
- journal club every semester
- PB seminars and discussions every semester

APPENDIX B

TYPICAL SCHEDULE FOR MASTER'S CANDIDATES

First Semester

- Plant Biology core survey course (PB I)
- One or two PB program-related courses
- PB seminars and discussions
- Thesis Advisor selected and approved by end of semester

Second Semester

- Thesis Committee assembled and approved as early in semester as possible
- Plant Biology core proposal writing course – optional (PB II)
- One or two PB program-related courses
- PB seminars and discussions

Third Semester

- at beginning of semester, Thesis Outline approved and submitted to Graduate School (at least four months before defending)
- One or two PB program-related courses
- journal club
- PB seminars and discussions

Fourth Semester

- journal club
- PB seminars and discussions
- Defense of Thesis Examination

APPENDIX C (1 of 2)

PhD PRACTICUM / ROTATIONS AGREEMENT FORM

Register for two credits, Biology 698A

Semester _____Student's name:_____

Student #_____Email:_____

Project objectives and planned activities (attach any necessary additional information)

Criteria for evaluation (see "guidelines for practicum grading")

Submitted by:
*Student (print name)*_____

*Signature*_____*Date*_____

Approved by:
*Faculty (print name)*_____

*Signature*_____*Date*_____

Submit form to the PB Program office, 217 Morrill South.

Approved by GOC:
*Signature of GOC Chair*_____*Date*_____

APPENDIX C (2 of 2)

Guidelines for practicum grading

Faculty expectations – letter grading for PB rotations/practicum credit

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A: Excellent performance in most areas. Shows potential to become a first-rate, independent, highly motivated and highly productive researcher. Likely to overcome any weaknesses.

AB: Good performance in most areas. Shows potential to perform capable, effective, independent research.

B: Adequate, but not much beyond adequate performance in most areas. Potential to become a solid but perhaps not fully independent researcher. Some weaknesses in ability or motivation.

BC: Serious weaknesses in important areas. Advisor has reservations about whether candidate has potential to do PhD level work.

C: Serious inadequacies in important areas. Advisor believes candidate lacks potential to do PhD level work.