



**Yale University
School of Medicine**

Medical Student Research Program

and the

Yale M.D. Thesis Requirement



Guide for Students and Faculty Sponsors

**Prepared by
The Office of Student Research
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1. HISTORY OF STUDENT RESEARCH AT YALE UNIVERSITY SCHOOL OF MEDICINE

The presentation of a dissertation has been one of the requirements for the degree of Doctor of Medicine at Yale for over 172 years. Initially, case reports and reviews of literature predominated, but as the scientific method was established in medicine, the faculty required that dissertations presented be based on original investigation either in the laboratory or in the clinic. This experience is considered an important and essential phase of a curriculum which is designed to promote the development of critical judgment, habits of self-education, imagination and scholarship, as well as the acquisition of knowledge and research skills.

The first evidence that the thesis or dissertation was considered a requirement for the degree of Doctor of Medicine is in a statement in the catalog from 1839, which in part reads, "...the candidate must present a dissertation on some subject connected with the medical sciences." This requirement remains in effect to the present time, and is enthusiastically endorsed by the faculty as a central component of the "Yale System" of general medical education.

The creative discipline required to carry out a project and prepare a thesis enables each student to become a physician-scholar, whether the ultimate objective is research, teaching, clinical practice or administration. Yale hopes to produce physicians who can evaluate data quickly and critically as they must do throughout their professional careers.

The M.D. thesis at Yale University teaches a student how to understand the scientific method from the inside, how to design a hypothesis, how to collect and evaluate data and communicate the knowledge to others, and how to think scientifically and critically for the rest of his/her professional life.

To this day, the Yale University School of Medicine has carried on the tradition of required medical student research. This tradition is a hallmark of the Yale system of medical education.

2. MEDICAL STUDENT RESEARCH PROGRAM AT YALE

a. Overview

All students at Yale University School of Medicine engage in research and are required to write an M.D. thesis during medical school, with the exception of students who have a Ph.D. degree in the biological sciences before matriculation. A wide choice of subjects for research is permitted. Students may choose basic laboratory projects or may investigate clinical, translational, epidemiologic or sociologic (including medicine and humanities) topics. Publications in the literature may serve as the source of data for research. Two basic requirements apply to all thesis research projects: (1) there must be a specific hypothesis that can be supported or rejected by new data that are generated by the student. Data must be subjected to statistical analysis and results should either confirm or reject the original hypothesis; and (2) the research mentor must be a full-time faculty member at the School of Medicine.

A close working relationship between the student and faculty research mentor is a major goal of this program and is strongly encouraged. When laboratory research is performed, it is the responsibility of the faculty advisor to provide all necessary space, equipment and supplies. If the project is concerned with clinical or epidemiological investigation, the same commitment to guidance and support is expected. Weekly conferences between student and advisor are encouraged during the course of the research. The research must be designed and specifically performed by the student with the advice of the faculty mentor. Students may not work jointly on a research project.

The research is presented as a formal bound thesis during the fourth year or graduation year and must fulfill the following minimal requirements (see page 22 for exact details):

- a. Title Page
- b. Summary (in abstract form)
- c. A critical review and citation of the work of previous investigators
- d. Valid research design
- e. Evidence of mastery of appropriate methodology, including a detailed description of what was done by the student and what was done by others. Please see details on page 22.
- f. Presentation and analysis of research data, including figures and tables
- g. Conclusions that are supported by the data
- h. A literate presentation
- i. Complete bibliography with full citations

Before the written report is presented to the Office of Student Research and the Thesis Committee, it must be approved in writing by the student's advisor and by a Thesis Review Committee in the department where the work was performed.

An Awards Committee critiques and ranks all student theses submitted for honors by various departments. The highest ranked papers are presented orally at Student Research Day held in May, chaired by the Dean of the School. Most theses are presented as posters at Student Research Day which is widely attended by students and faculty. Thirteen prizes are awarded at graduation for outstanding student research. Prizes are not announced until graduation.

b. Time Available for Research

Practically all students begin research work during the summer following their first year. For example, during the summer of 2011, 85 (of 91) first year medical students remained in New Haven to work with faculty members on a wide variety of projects. Students who conduct research the summer after their first year at another institution are responsible for securing funding from the other institution. If there is a planned collaboration between the student, the Yale faculty sponsor and the faculty at the other institution (for example, shared reagents, shared database or patients, continuation of the project at Yale) then a maximum of 50% funding may be provided by the Office of Student Research if the project is approved. This funding restriction does not apply to research carried out at another institution after the summer of the first year. Students are discouraged from beginning their thesis work at another institution during the summer between the first and second year.

Stipends are available to support summer research and other periods when full-time research is performed. Many students continue their research work in the afternoons, evening and weekends during the second year of medical school. There is an additional eight week block available for student research during the summer before beginning the third year. Additional three month blocks are available in late third year to mid-fourth year for completion of research work. Thus, a total of six to nine months is currently available for research by each Yale student during four years at medical school.

A reminder: We recommend that the actual time devoted to data collection (laboratory or other) be accomplished in a ten-to-sixteen week period or its equivalent in days. Additional time is then needed for planning and literature review, for evaluation of data and final write-up. Stipend support is for full-time periods when students are carrying out the research, but financial support is not provided for writing the thesis.

c. Elements of Yale Curriculum Favorable for Student Research

The Yale medical curriculum provides an ideal milieu for encouraging research training by students because the curriculum differs in important elements from traditional medical school curricula as follows:

1. The number of scheduled class hours is less than other medical schools in the United States.
2. The lack of competition through unsigned examinations in basic science courses is unique.
3. The M.D. thesis requirement at Yale is unique, although the Harvard curriculum and the new curriculum at Duke include a research elective component.

Thus, there is substantial time available for training and independent research by students. There is an established tradition for faculty to encourage students as colleagues in a community of scientists. Finally, Yale Medical School recruits an outstanding body of students who at the time of matriculation are aware of the requirements and expectations for creative scholarly work. This system has spawned a large number of eminent M.D. investigators.

3. GETTING STARTED

a. Resources Available

A list of faculty members and their areas of research is available on-line in the World Wide Web and is provided in hardcopy to each student. To access the faculty research information use Netscape and open the URL and type <http://medicine.yale.edu/education/osr/index.aspx>. You may search by keywords or by individuals listed in each department.

Dr. Forrest, Director of the Office of Student Research, is available to discuss options with individual students by appointment. After deciding upon the area of general interest, the student should interview with members of the faculty in both the basic and clinical sciences who are working in that field. After appropriate discussions with several potential mentors and others working in their group the student should choose the faculty member with whom he/she wishes to work. Although it is not necessary that the idea for the thesis originate with the student, it is necessary that the work be his/her own. The student can work as a member of a group project only if the student's contribution is carried out on an independent basis. Dissertations written jointly by two or more students are not acceptable.

Most Yale M.D. theses average 40-80 pages of text. A minimum of 30 pages of text excluding figures, legends and references is required (see page 22).

Publications. In planning a project, it should be clear that the prime goals are to ask an important question, formulate a hypothesis, and learn appropriate methods and techniques, and not necessarily to publish a paper. Publishing the work, however, is greatly encouraged, and the student should be encouraged by the faculty advisor to write the first draft and to be first author on the manuscript. Papers can be published at any time and are independent of the MD Thesis. The faculty member should make every effort to orient the student to a practical problem that can be fulfilled within the available time.

b. Need for a Hypothesis

Excellent research begins with a clear hypothesis which can be examined by the generation of new data by state-of-the-art techniques. The hypothesis should be original and one which will generate substantial interest by leading investigators in the field when answered. It is not excellent research to investigate a hypothesis which is highly predictable or expected or in which there will be little interest. A review of the literature (meta-analysis) or review of patients' charts may be the source of data used for a thesis. However, the basic requirement still applies. There must be a hypothesis which can be supported or rejected on the basis of data gleaned from the patients' records or published literature. These data should be subjected to statistical analysis, and the results should either confirm or reject the original hypothesis. As with any other thesis, a review of the literature and a section dealing with the interpretation of the data and a discussion of its importance should be included. A literature review cannot be a simple narrative describing the information obtained from these sources.

c. Literature Review, Protocol Formulation, and Application for Funding

When the area of investigation has been approved by the faculty preceptor the student is expected to explore the literature and formulate a protocol. This step provides an unusual opportunity for tutorial instruction in experimental design. Faculty members who assume responsibility as preceptors should provide the amount of guidance that is necessary in design of the investigation. The final protocol and application for funding should then be reviewed and approved by the faculty advisor and then by the Department Thesis Chairperson.

d. Statistical Analysis

When the results of an investigation lend themselves to statistical analysis, the student should be encouraged to seek the aid of a biostatistician for assistance in statistical methodology. It is hoped that this will enable the student to learn the value and limitations of statistical analysis as an aid to interpreting the results of an investigation. See the list of Secondary Thesis Advisors for clinical epidemiology and clinical research methods.

e. Research Involving Human Subjects

All research involving human subjects must be approved by the Human Research Protection Program formally known as Human Investigation Committee of the School of Medicine. Applications and guidelines are available online at the Human Investigation website at <http://www.yale.edu/hrpp/>

f. Joint Projects Not Acceptable

Dissertations written jointly by two or more students are not acceptable. This does not mean that they may not work on related problems, but each student should have the experience of carrying out an investigation from beginning to end on his/her own initiative.

g. Research Done Outside of the Yale Medical School

First-year students considering research at another institution

Research at another institution is clearly discouraged in the summer of the first year. The reasons for this are as follows:

(1) It is important to get started on a project that has a high likelihood of being used for your thesis with a Yale faculty mentor at Yale. If you are working at Yale, you have ready access to either the laboratory or the study population and the mentor with whom you are working.

(2) Funding in the summer of the first year comes predominantly from training grants and Yale funds which require that the work to be done at Yale.

(3) Carrying out the work at Yale readily ensures that the student will receive excellent training in conducting research since the Yale faculty member knows the Yale thesis system and the responsibilities of the mentor.

For these reasons students are advised to begin their work at a Yale site with a Yale advisor in the summer of the first year.

If you decide to do research at another institution (non-Yale site for example, Harvard, Columbia, Stanford, etc.) you are responsible for obtaining your funding. You should be certain to have a Yale sponsor before you complete the arrangements at the other school because this Yale faculty sponsor will need to approve your application for partial funding (if allowed) and will make comments if this work is ultimately used for your thesis and will have the thesis reviewed in his or her department at Yale.

The above does not apply for research done after the first year.

Concerning your responsibility for funding if work is done at another institution in the summer of the first year:

(1) The responsibility for funding is yours.

(2) If there is a significant connection of the work to the Yale faculty sponsor, i.e. if you are using reagents from the Yale lab, if you are using study populations at Yale as well as the other institution, if you plan to continue the work in the Yale advisor's group when you return to Yale etc. then it is possible to obtain half funding from Yale. This is the maximum funding that can be obtained if there is a legitimate connection to the Yale sponsor. If the Yale sponsor is serving as a passive conduit and is not taking an active role in examining the proposal, making suggestions, etc. then the student alone is responsible for obtaining complete funding generally from the other institution or from a national organization.

Obtaining funding from another institution:

Frequently, if the investigator at another institution is well funded they will readily fund all or half of your application. If they are not willing to do so you should reconsider this choice. The Office of Student Research is willing to make one phone call to the P.I. at the outside institution to encourage them to provide full or partial funding. This is sometimes successful and sometimes not. Students should recognize that it is preferable to begin the work at Yale when research is begun in the summer of the first year.

Research at an outside institution done after the first year:

Students performing research at another institution other than the summer of the first year can receive full funding from the Office of Student Research if the following requirements are met:

(1) The application for funding for full-time research is approved a Yale faculty sponsor who will be responsible for reviewing the thesis and submitting the work in their department.

(2) This applies for both short-term funding and one-year medical student research fellowships, which also can be done at other institutions for some pullout fifth year programs (Sarnoff, Howard Hughes and institutions that have Doris Duke programs).

Second-year and beyond considering research at another institution:

A student may wish to undertake his/her research project under the supervision of a qualified full-time investigator who is not a member of the faculty of Yale University School of Medicine. **The approval of an outside preceptor will be granted by the Office of Student Research upon receipt of a statement by a full time Yale faculty member acting as sponsor and mentor, in whose area the research work will be done.** The statement should indicate the Yale mentor has approved the preceptor and the facilities available for the research project. The same regulations concerning the dates of submission and review by the appropriate departmental committee will apply to the thesis done outside of the medical school. Specifically, the faculty member will be responsible for reviewing the progress of the thesis with the student, reviewing the written thesis and giving faculty approval. The thesis will be reviewed by the Department Thesis Committee of this faculty member's department.

h. Ph.D. Thesis in Lieu of Medical School (M.D.) Thesis

For students enrolled in the combined M.D./Ph.D. Program, the doctoral thesis submitted to and approved by the Graduate School will serve in lieu of the thesis requirement of the Medical School. The Graduate School awards degrees twice a year, in late fall (November or December, depending on the Corporation schedule) and May. In order to guarantee consideration by the appropriate Graduate School Committee on Degrees, the dissertation must be submitted by October 1 for a fall degree, or March 15 for a May degree. **Students planning to submit the dissertation on March 15 for a May degree, however, should make every effort to file the petition by mid-February, so that planning for commencement ceremonies can proceed in a timely fashion. If the Ph.D. has not been completed, a separate M.D. thesis must be submitted to qualify for the M.D. degree.**

i. Applied Principles of Clinical Research

Several years ago, at the recommendation of students, Yale Medical School established a new requirement for all students carrying out thesis work in clinical research areas, including those graduating in four years, which is participation in the Applied Principles of Clinical Research Tutoring Sessions in July and August each summer. The NIH now also requires these sessions.

Students have found these sessions to be extremely useful and have encouraged their continuation. Instructors will use examples from your applications for summer research support. It is strongly recommended that you attend these tutoring sessions that will aid you in the design and execution of your planned summer research, thesis work, and our meetings for which you will receive credit. On the following three pages is the syllabus.

Summer 2011

Location: See Discussion Sections below for room locations

The purpose of this intensive two-week course is to provide an overview of the objectives, research strategies, and methods of conducting patient-oriented research. Emphasis is placed on applying concepts to students' actual research projects. Sessions are workshops that combine didactics and use students' projects to illuminate concepts. Participation is critical to the success of this seminar.

Seminar Leaders, Sections, Contact Information:

Sarwat Chaudhry, M.D.

Karen Dorsey, MD, PhD

Nancy Kim, MD, PhD

Marcella Nunez-Smith, MD, MSc

Assistant Professor, GIM

Assistant Professor, Pediatrics

Instructor, GIM

Assistant Professor, GIM

Administrative Assistance in the Office of Student Research:

Donna Carranzo, donna.carranzo@yale.edu

Mae Geter, mae.geter@yale.edu

	DISCUSSION SECTIONS	CONTACT INFORMATION
Sarwat Chaudhry	9:00 am – 10:30 am, M-Thurs 7/12-7/15; M-Thurs 7/19-7/22 (Times remain the same for all sessions) Location: TAC N211 all dates with the exception of 7/22 in JEH H315	203-785-2651 sarwat.chaudhry@yale.edu
Karen Dorsey	1:30 pm -3:00 pm, M-Wed & Friday 7/12-7/14 & 7/16; M-Wed & Friday 7/19-7/21 & 7/23 (Times remain the same for all sessions) Location: TAC N209 all dates with the exception of 7/23 in TAC N211	203-737-9227 karen.dorsey@yale.edu
Nancy Kim	3:00 pm – 4:30 pm M-Thurs 7/12-7/15 1:30 pm – 3:00 pm M-Thurs 7/19-7/22 (Please note change in times for second week) Location: TAC N209 7/12-7/15; TAC N211 7/19-7/21; JEH H315 7/22	203-932-5711 X 5371 nancy.kim@yale.edu

Marcella Nunez-Smith	3:00 pm – 4:30 pm, M-Thurs 7/12-7/15 9:00 am – 10:30 am M-Thurs 7/19-7/22 (Please note change in times for second week) Location: TAC N211 7/12-7/15; TAC N209 7/19-7/20; JEH H316 7/22	203- 785-6454 marcella.nunez-smith@yale.edu
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Office Hours:

To make an appointment, please send an e-mail with the issue that you would like to discuss and the times that you are available within a 1-2 week period; We will schedule a meeting as quickly as possible. If you have any questions or need additional information, please do not hesitate to contact us.

Readings (before class):

Readings include articles and text chapters. The readings provide a broad overview of topics for students with diverse interests. Materials will be available in class and posted on Blackboard.

Recommended texts:

Stephen Hulley, Designing Clinical Research
Lange, Basic Clinical Biostatistics

Attendance:

Students are expected to attend all tutorials in their own section.

If you are unable to attend any section during a given week you can complete a make-up assignment. This can only be done once during the summer session.

In order to receive credit for the course students must attend or receive credit for at least 6/8 sessions.

Learning Objectives

The overall objectives of these assignments are to:

- Understand the fundamental principles of research architecture and design in the medical literature
- Assess critically the scientific literature as presented in professional journals and the popular media
- Construct research hypotheses and study designs to test these hypotheses

Course requirements / Grading

Course requirements are designed to focus on the development of skills and a knowledge base that should be useful as your research project develops – and beyond.

1. Class Participation (40%)

All students are expected to attend and participate in class discussion. The discussion groups provide a great opportunity to develop intellectual relationships with your

peers, the Seminar Leaders, and to move your projects forward with help from the group in real time.

2. **Daily Exercises (in class) (30%)**

This course is a brief introduction to some of the fundamental principles of patient-oriented research. To deepen discussion and understanding of course topics, you will be asked to apply the concepts from the readings and didactics to your own research projects.

This process is not to be a burden or to interfere with the reading itself. The goal is to promote critical thinking, and to help students abstract a few key points from a group of readings. The ideas generated will guide our class discussion. These will be graded on quality, not the amount written.

3. **Project proposal or abstract (not to exceed 5 pp) (30%)**

A completed project proposal will be the final assignment. It should include specific aims, hypotheses if appropriate, background, methods, significance, limitations, and human subjects sections. As with all assignments, be sure to include appropriate scientific citations. Details for this assignment will be discussed during class. Proposals due one week after the last class.

July 12

Research Design

Readings: Hulley, Chs. 1, 7

Supplementary Reading: Hulley, Ch. 8

July 13

How to Ask a Research Question

Readings: Hulley, Ch. 2

July 14

Bias / Confounding

Readings: Hulley, Ch. 9

July 15

Data Collection

Readings: Hulley, Ch. 15

July 19

Qualitative Studies

Readings: Bradley, JAMA articles (2)

Supplementary reading: Green, Kitto

July 20

How to Write a Research Proposal

Readings: Hulley, Ch. 19

July 21

How to Write a Paper/ Give a Presentation

Readings: Driscoll

Readings: Harradine

July 22

Managing Mentors/ Special Topics / Wrap up

Readings: Sackett, Thoma

Supplementary reading: Reynolds, DeLong

4. ONE YEAR MEDICAL STUDENT RESEARCH FELLOWSHIPS

The School encourages many students to consider a fifth year of medical school and devote it exclusively to research funded by a formal One Year Student Research Fellowship. This Student Research Fellowship Program is facilitated by charging no tuition for the extra year and by the provision of a limited number of stipends that can be paid to students. In 2011-2012, thirty four (34) students received full one year fellowships and an additional 32 fifth year students received funding for less than a full year. Stipend levels are approximately \$25,000/year. These stipends are available on a competitive basis and students are eligible to apply after the second year. See separate booklet with details and deadlines on these fellowships. Current available funding sources include: Doris Duke Charitable Foundation, Howard Hughes Medical Institute, NIH-TL1-CTSA Award, Sarnoff Foundation, National Institutes of Health, American Heart Association, and Yale sponsored funding.

All stipends are paid directly to the student and are considered taxable income.

5. JOINT DEGREE PROGRAMS

a. Joint M.D./Master of Health Science Degree Program

Yale University School of Medicine and the Office of Student Research have established a new joint degree, the MD-Master of Health Science (MD-MHS) which was approved by the Yale Corporation in January 2006. There are currently 36 Yale medical students in this program.

There are two pathways in the MD- Master of Health Science degree for medical students. These are a clinical research pathway and a laboratory/translational pathway. The clinical research pathway also includes medical research projects in the broad areas of medicine and the humanities (medical history, medical -legal, bioethics, etc). The MD-Master of Health Science degree requires a fifth year pull out supported by a fully funded one year medical student research fellowship at Yale (currently Doris Duke Charitable Foundation, Howard Hughes Medical Institute-Yale, Yale NIH TL1, NIH-NIDDK, Yale Endowment Fellowships).

The research project in the fifth year is the centerpiece of the MD-Master of Health Science degree program. In addition are the following requirements:

1. The project mentor and a two or more person thesis committee must be approved by the Office of Student Research and the Master of Health Science Advisory Committee.
2. Additional coursework is required:
 - a. **Clinical research pathway** – Courses: Principles of Clinical Research; Applied Biostatistics; Organization and Leadership; Ethical and Practical Issues in Clinical Investigation (during Masters year)
 - b. **Laboratory/Translational research pathway** – Courses: Intensive Pedagogical Experience in Techniques and Strategies for Laboratory Research or Selected Seminars in CBB 740a Clinical and Translational Informatics; Organization and Leadership; Ethical and Practical Issues in Clinical Investigation (during Masters year)

These courses can be taken prior to the Masters year or during except the Ethical and Practical Issues in Clinical Investigation which must be taken during the Masters year.

3. Participation in monthly seminars, journal clubs, Leadership in Biomedicine lectures and dinners, and other announced activities throughout the Masters year.

b. Joint M.D./M.P.H. Degree Program

For students in the M.D./M.P.H. Program, one thesis satisfies both degree requirements provided it is approved and carried out under a Yale faculty member of the Department of Epidemiology and Public Health and is in an appropriate subject area. The same regulations concerning content, organization and dates for submission of the M.D. thesis and review by the appropriate departmental committee will apply.

c. Joint M.D./J.D. Degree Program

The Yale School of Medicine has a formal relationship with the Law School to allow students to seek degrees from both schools. This can be done in six years instead of seven. A focused M.D. thesis, answering a significant question of relevance to medicine is required for the M.D. portion of the degree. Six years are required for the combined M.D./J.D. Program.

d. Joint M.D./M.B.A. Degree Program

The purpose of the joint-degree program in medicine and management is to develop clinician-managers capable of pursuing careers that balance delivery of patient care with sound management in a changing health-care environment. The joint-degree program normally requires five years of study and simultaneous award of the degrees of Doctor of Medicine and Master of Business Administration at the conclusion of the five-year period. A focused M.D. thesis, answering a significant question of relevance to medicine is required for the M.D. portion of the degree. Six years are required for the combined M.D./M.B.A. Program.

e. Joint M.D./M.Div. Degree Program

Students who have been admitted to the Yale School of Medicine and are enrolled for the M.D. degree may apply to the Divinity School or admission to a combined program leading to the degrees of Doctor of Medicine and Master of Divinity. The joint program is tailored to the individual interests of students seeking professional education and training in a theological understanding of the self, society, and work; in bioethics; in international health and missions; in hospice or similar patient-care facilities; or in academic work in teaching, counseling and chaplaincy. A focused M.D. thesis, answering a significant question of relevance to medicine is required for the M.D. portion of the degree. Six years are required for the combined M.D./M.Div. Program.

6. RESPONSIBILITY OF FACULTY MENTORS

To insure understanding of the faculty mentor's role, the following suggestions have been made:

- The faculty mentor should make every effort to orient the student to a practical problem that can be addressed within the available time. This usually requires multiple meetings with the student culminating in protocol and an application for funding which contains the following elements.
 1. background of the problem being investigated
 2. hypothesis that will be examined
 3. specific aims of the study
 4. methods that will be used including details of the specific design of the study
 5. selected references from the sponsor's work
 6. selected references from others

The faculty mentor must review, approve and sign the application for funding. The application is also reviewed and must be approved for feasibility, hypothesis, study design by the Department Thesis Chair.

- We recommend that the actual time devoted to data collection (clinical, laboratory or other) be accomplished in a twelve-to-sixteen week period, minimally. Additional time is needed for planning and literature review, for evaluation of data and final write-up. Currently 50% of Yale students elect to spend a fifth year of medical school devoted fully or partially to thesis research. (See separate "One Year Medical Student Research Fellowship Information" available hardcopy and on line.)
- The student should not be assigned as a research technician to accomplish someone's project in the lab, including fellows.
- The faculty mentor should invest sufficient time in the student, including weekly meetings to discuss results and where necessary, help to focus (or refocus) the direction of the project.
- The student should develop with the faculty mentor his or her own project (although others may participate) and should eventually be encouraged by the faculty mentor to be first author on abstracts and publications.
- The faculty mentor is responsible for all research expenses (i.e. space, resources, and facilities) and the supervision of the experimental work.
- The faculty mentor is the first reviewer and gives the initial approval of the thesis as submitted for graduation. (For more information see "Thesis Approval Process")
- The faculty mentor should plan to attend Student Research Day activities held in May of each year.

7. DEVELOPING A CLINICAL RESEARCH PROTOCOL: THE SURVIVAL GUIDE

Opportunities are available to pursue a thesis project in either basic or clinical research. Clinical research is less completely “controllable,” and is therefore more subject to potential confounders and sources of bias. However, clinical research offers the advantage of more direct clinical relevance. Whatever topic you choose, you can likely find a qualified advisor in the medical school. But an advisor knowledgeable in your area of interest may or may not have a strong background in research methods. If they do not, you should be prepared to follow a systematic process in the development of your project to be sure the results are what you intend.

Be advised that data do not make a thesis. Without an excellent hypothesis, defined outcome measure(s), and good methodology, collected data cannot lead to meaningful insights. Above all, a good thesis depends on an excellent hypothesis. It is more than coincidence that a “thesis” is derived from the underlying “*hypo*-thesis.”

The following sequence is recommended for the development of a clinical research or epidemiology thesis project. Don’t wait for your advisor to bring up each component; they may never do so. You should be assertive in addressing the following items before you begin the actual research. If you and your advisor are uncertain about or want help with any of the steps below, there are experts in methodology available for consultation (See section on Secondary Thesis Advisors). Be sure to obtain such a consult early. There is little that methods can offer once the data have been collected.

1. Start with a good question. In general, “good” or “excellent” is best defined as a question for which the answer matters either to other researchers in the field, practicing clinicians, or patients. Remember, you will likely do just as much work to answer a question which has “below average” interest to others as you will in answering a question which others will call important.
2. Convert the question to a hypothesis by asserting a position. This will lead directly to a consideration of measures, both of exposure and outcome.
3. Generate measures of exposure and outcome. This step is facilitated by a review of the pertinent literature. How have other researchers defined/measured the exposure and/or outcome? The effort to generate meaningful measures will generally require a return to the hypothesis for refinement, and narrowing (i.e., express the hypothesis in terms of the specific exposure of interest, and the specific outcome anticipated).
4. Once a reasonable hypothesis developed, a protocol should be constructed. How can the hypothesis be tested? The first requirement is that a comparison be made. Here, too, a search of the literature for methods will be helpful. Choosing the right control group is challenging, and subtle. Once the comparison group is chosen, the magnitude of expected difference should be estimated, as a basis for determining sample size (power calculation). In clinical research, standard methods include cohort studies (prospective, or retrospective; the randomized controlled clinical trial is a sub-category of the prospective cohort study) that assemble groups on the basis of exposure/intervention, and follow for outcome; and case-control studies that assemble groups on the basis of the outcome and assess for previous exposures. We urge you to use one of the three.

5. In light of the design you deem most appropriate, revise your measures of exposure and outcome as required. For example, in a prospective study, you can choose how to measure factors of interest, whereas in a retrospective study you will need to rely on measures obtained in the past, or the subjects' recall.
6. Once your measures are established, determine the appropriate sample size and the methods of analysis. A plan for data collection and management should also be developed. Consultation with a statistician may be helpful at this stage. Now is the time to assess feasibility. Specifically, the following questions should be addressed: Can enough people be obtained for the study? Can the outcome events be observed and suitably analyzed?

The research should only begin after steps 1-6 are dealt with successfully. Again, there are no methods that can transform a vague question and data into a methodologically rigorous study after the fact. Good methods must come first.

The following resources may be of help to you in developing or completing your thesis research:

- Secondary Thesis Advisors

The Yale faculty members list below all have expertise in the methodology of clinical studies, clinical epidemiology and biostatistics. These faculty members have agreed to work with a maximum of two students per year as a secondary thesis advisor. A secondary faculty advisor should become involved on the student's thesis at an early date (preferably in the first few weeks of the project and before any data is collected). The advisors have agreed to meet with students for four sessions at the beginning of the thesis project and an additional four sessions after the data has been gathered. The initial meeting should be attended by both the medical student, the primary thesis advisor and the secondary faculty advisor. The focus will be on developing excellent methodology. Please see the Directory of Faculty Research Interests for more detailed information on the faculty advisors specific areas of interest.

<u>NAME</u>	<u>DEPARTMENT (telephone)</u>
John Concato	Internal Medicine (203-932-5711, ext. 2993)
Karen Dorsey	Pediatrics (203-737-2182)
Tom Gill	Geriatrics (203-688-9423)
John Hughes	VA-Internal Med (203-932-5711: Ext: 7197)
David Katz	Epidemiology & Public Health (203-785-6283)
Walter Kernan	Internal Med (203-764-7564)
Nancy Kim	Internal Med (203-764-5675)
Harlan Krumholz	Internal Med (203-764-5885)
John Leventhal	Pediatrics (203-688-2468)
Marcella Nunez-Smith	Internal Medicine (203-785-6454)
Patrick G. O'Connor	Internal Med (203-688-6532)
Eugene Shapiro	Pediatrics (203-688-4555)
Richard Schottenfeld	Psychiatry (203-974-7349; 203-432-0550)
Mary Tinetti	Geriatrics (203-688-5238)

Computer facilities for statistical analysis:

Yale's Prevention Research Center (PRC), located off-campus in Derby, is a resource to students needing assistance with data management and/or statistical analysis, survey development and validation, as well as refinement of clinical study methodology. The PRC data management staff will work with students to perform statistical analysis using a variety of software packages. Referrals can be provided as needed to additional resources available through the computer labs at the Yale Schools of Public Health, and Management. Contact the PRC at 203-732-1265, or Dr. Valentine Njike, data manager, at valentine.njike@yalegriffinprc.org.

8. MEDICAL RESEARCH IN THE HUMANITIES AND THE ARTS: A SURVIVAL GUIDE

Each year some students elect to conduct medical research for their M.D. thesis in one or another area of the humanities, social sciences, and the arts (including medical history, medical ethics, medicine and the law, film, photography, medical sociology, medical anthropology, and literature). Like other kinds of student research, the creative discipline required in pursuing the M.D. thesis in these areas helps shape the physician-scholar by cultivating critical judgment, imagination, and scholarship, while developing critical research skills and making an original contribution. At the same time, the challenges involved in research pursued in the archive, library, or field may differ from those encountered in the laboratory.

The Office of Student Research recognizes that distinct methodologies may be required for research conducted at the cutting edge of the humanities, social sciences, and the arts. It is committed to fostering an environment in which students are supported and encouraged to produce work of the highest quality and rigor that is in keeping with the best standards of scholarly research within the discipline in which they are working. Students who wish to pursue medical research projects in the humanities, social sciences, and the arts are eligible to apply for competitive research stipend support. Support from the Office of Student Research is given for student research stipends only, not for the costs of the research itself which is the responsibility of the faculty advisor.

Given the diverse nature of the fields encompassed by the medical humanities and the arts, it is not possible to delineate a single method or approach that suits all projects. Students should work closely with their advisors to gain an understanding of the research methods and forms of analysis best suited to the discipline in which they are pursuing their thesis, or to develop approaches appropriate to interdisciplinary work. All research must attempt to answer a focused question related to medicine that is of interest to other scholars in the field. Research originates with a question, or hypothesis or problem, and requires a clear articulation of a goal and a systematic plan of approach. **A starting point is to review critically the research literature on the given question and related areas.**

It is important to recognize two ways in which rigorous research in the humanities and the arts may differ from exploration in the laboratory and clinical sciences. First, such investigations may be (though by no means always) qualitative, and may not be advanced by statistical analysis. In other cases, studies would be significantly improved by a combination of qualitative and quantitative research methods. Second, while research in these fields must answer an important question related to medicine, the question may not be formulated as a testable hypothesis. Alternative ways of thinking about the aims of a strong research project, informed by the best-practice research norms of different disciplines, are the construction of an evidence-based “argument,” or the production of generalizable knowledge, or (for the arts) the inclusion in the written thesis of material that is thoughtful, important, and makes an innovative contribution.

Sometimes the mentorship needed for a qualitative medical research project is easy to identify. For example, if you were interested in determining how and why an ill *chicana/o* resident of San Antonio, Texas chooses between consulting a *curandero* and consulting a practitioner of biomedicine, or if you wanted to examine what pediatric residents learn about social and cultural issues during their outpatient experience in a New Haven clinic, you might want guidance from an anthropologist or sociologist in addition to a pediatrician. You would

want help from an historian if, starting with an interest in how cultural factors shape responses to “new” diseases, you decided to explore Peruvian responses to cholera in the 1830s, British responses to HIV/AIDS in the early 1980s, or New York City responses to multi-drug resistant tuberculosis outbreaks in the prison system during the 1990s. If you were interested in the larger cultural meaning of the depiction of women physicians and medical students in late-Victorian novels, or of internship experiences in late-twentieth-century autobiographical and fictional accounts, then probably you would want to seek guidance from mentors in literature and history.

Medical students whose interests have led them to a set of questions about health and culture, medicine and society, may not know which scholarly fields offer the most promising research and analytical tools. If you were interested in a project that would make an innovative contribution to understanding the relationships between poverty and health in New Haven, for example, you might find yourself asking questions about culture that various interpretive methods from the humanities, social sciences, and the arts can help address. Perhaps you want to understand what health and illness mean to HIV-positive mothers and how they make sense of the relationship between health and poverty in managing the lives of their children. Or perhaps you want to understand how information about serving as a paid clinical research subject circulates in the community, and how the role of the healthy research “volunteer” is perceived. Or possibly your interest is in childhood obesity and you decide to explore sports, body image, and cultural esteem among 13 year old girls in an intercity school, or you decide to enlist photography as one medium to explore the nutritional environment of childhood poverty. All of these projects use methods regularly used by scholars in the social sciences, humanities, and the arts. If your research interests involve such questions about health, culture, and society, then we encourage you to begin a careful review of the scholarly literature on the topic. This is a critical first step. We also encourage you to contact the Yale Medical Humanities and the Arts Council. They are available to help identify the kinds of guidance best suited to your aims (email john.warner@yale.edu).

Medical students may work with any approved Yale University faculty member on their thesis so long as the work is supervised, sponsored and approved by a full-time School of Medicine faculty member in whose department the thesis will be reviewed, and the Office of Student Research. Dual mentorship often is particularly appropriate to medical research in the humanities and the arts, and enables students to draw upon the rich mentorship resources available elsewhere in the University. The Humanities and the Arts Council can help students identify prospective medical school mentors, and also can help identify co-mentors from across the University whose primary faculty appointments are outside the School of Medicine.

9. QUALITATIVE RESEARCH STANDARDS AND TECHNIQUES

This is currently being developed by a committee and will be available in the Spring of 2012 as a handout. If you are considering qualitative research, please be sure to contact the Office of Student Research for this handout.

10. FUNDING FOR STUDENT RESEARCH

The Office of Student Research provides three types of stipend support for student investigators. These are:

- a. Summer Research
- b. Short-term Research
- c. One-year Medical Student Research Fellowships

All programs require a competitive application. Summer research stipends are awarded specifically to students between the first and second year. Short-term stipends are awarded for specific blocks (1-3 months) during the academic year when full-time research is performed and during subsequent summers. These stipends are supported by a variety of organizations (NIH, Howard Hughes Program, private donors, and University funds.)

Deadlines for one year medical student research fellowships are available in the Office of Student Research and on our website. Deadlines for short term and summer research are listed below and also available on our website.

a. Summer Research Deadlines

April 20, 2012 - Department Thesis Chair
May 4, 2012 - Office of Student Research

b. Short-term Research Deadlines (2011-2012)

August 19, 2011 – Department Thesis Chair
September 2, 2011 –Office of Student Research (Research Sep; Oct;
Nov.)

October 21, 2011 – Department Thesis Chair
November 4, 2011– Office of Student Research (Research Dec; Jan;
Feb.)

January, 20, 2012 – Department Thesis Chair
February 3, 2012 – Office of Student Research (Research Mar; Apr;
May.)

April 20, 2012 – Department Thesis Chair
May 4, 2012 – Office of Student Research (Research Jun; Jul; Aug.)

11. THESIS APPROVAL PROCESS

There are three levels of review of M.D. theses as follows:

- First Level** - Student/Thesis Advisor
- Second Level** - Departmental Review
(Departmental Thesis Committee)
- Third Level** - Thesis Awards Committee
(Thesis Subcommittee)

1. All students expecting to graduate in May of a given year, complete in the fall of the preceding year, a Thesis Information Form indicating:

- the title of his/her thesis;
- his/her advisor and department

This Thesis Information Form must be signed by the student and forwarded to the Director, Office of Student Research.

2. Students must include in the methods portion of their thesis, specific details of exactly which procedures, methods and experiments were conducted by the student and which procedures, methods and experiments, generation of data, or production of reagents, were performed by others. It is recognized that students may often be completing a portion of a larger work. A statement detailing precisely what was done by the student and what was done by others does not detract from the thesis and is necessary for academic honesty.

3. Following writing, reviewing and editing of drafts of the thesis by the student and approval by his/her thesis advisor, a formal letter from the faculty advisor must be sent to the Department Thesis Committee Chairperson indicating faculty approval of the thesis. The advisor must be a member of the full time faculty at the School of Medicine. This letter should accompany the submission of the thesis by the student for departmental review. This letter should state that the work is original and has been done by the student.

4. All student theses should be reviewed by at least one external reviewer at the Departmental Thesis Chair level of review. An external reviewer is defined as external to the specific project and may be a member of the department or the section where the work is performed or may be a member of another department. This reviewer is strongly urged to meet in person with the student to describe her/his comments and suggestions. A written summary of the reviewers critique (which may be brief) should be sent to the student and to the Department Thesis Chairperson.

5. Changes recommended by the reviewer(s) are then incorporated into the final bound thesis copy. Upon completing the recommended changes the student will be notified by the Departmental Thesis Chair of his/her approval and the student can proceed on binding the thesis and final submission to the Office of Student Research.

12. THESIS AWARDS

1. Recommendations for Honors - Elements of the third review (Awards Committee). The basis for honors should be an excellent to outstanding thesis with original observations already published in a peer-reviewed journal, or submitted for publication, or planned submission by a certain date, or judged worthy of publication in a peer-reviewed journal. This information should be included in the letter from the advisor, including details of the publication ie. already published, submitted, planned by a date or a thesis. One thesis per department, or 20% of the total theses done in a department may be submitted for honors only if each meets the criterion for honors.

2. Theses submitted by the Departmental Thesis Committee to the Thesis Awards Committee for honors consideration must be accompanied by the following:

a) a letter from the faculty advisor recommending the thesis for honors, indicating why it is recommended and stating specifically all methods and data generated by the student and all methods and data generated by others. The letter should indicate any publications resulting from the work or in preparation. To be considered for honors, the faculty advisor must indicate that in his or her opinion, the work of the student is definitely considered to be worthy of publication in a peer-reviewed journal and details of this publication should be given as above.

b) a letter from the Department Thesis Committee Chairperson indicating the reasons for recommending for honors. Comments or a letter from the external reviewer may also be included.

Note: If more than one thesis is submitted by a Department, the Departmental Thesis Committee should list in rank order the department's nomination for honors.

13. REQUIRED COMPONENTS OF THE FORMAL M.D. THESIS

- a. **Hard bound copy. Both a hard bound and a digital copy are required as below.**

(In Order for Final Submission of Bound Copy)

Length- Most Yale M.D. theses average 40-80 pages of text. A minimum of 30 pages of text excluding figures, legends, and references is required.

1. **Title** page. - Title should not exceed 100 characters including spaces between words (see details page 26).
2. **Abstract** page, as described, (see details page 34).
3. **Acknowledgements** (personal and faculty acknowledgements, grant support, departmental support, etc.).
4. **Table of Contents**, with page numbers for each section.
5. **Introduction** (a thorough, complete, detailed and relevant review of the literature is required).
6. **Statement of purpose specific hypothesis and specific aims of the thesis.**
7. **Methods – Please Note:** Give details of all methods used. Describe in detail exactly which procedures, methods and experiments were conducted by you and which procedures, methods and experiments, generation of data, or production of reagents, were performed by others. It is not sufficient to state that this information may be mentioned elsewhere. It must be summarized here.

It is recognized that students may often be completing a portion of a larger work. A statement detailing precisely what was done by the student and what was done by others does not detract from the thesis but is necessary for academic honesty.

If pictures are used you must obtain written permission from patients, parents or guardians and this should be added to the methods section. You could also consider masking faces or eyes.

8. **Results** – All primary data related to the thesis topic should be presented with the important data given in figures or tables. If preferred, figures and tables should be included in this section and should be explained in detail in the text. Tables and figures can be presented separately after the discussion but, if possible, it is advantageous to the reader to include tables in the body of the results section (as in a manuscript). All data should include the number of observations, and mean values \pm S.E.M. or \pm S.D.

9. **Discussion.** (Thorough and detailed interpretation and analysis of data and reference to and analysis of other literature.)
10. **References** – We strongly recommend the use of Endnote for formulating the references. Indicate references in the text by sequential numbers in parentheses (do not use subscript). In the Reference section, list references numbered in the order in which they appear in the text in the format shown below (note that the initials of the authors always follow the surnames, and that there should be no space between more than one initial). Include all authors' names up to 5 authors (use *et al.* after the 5th author) and complete article titles. Indicate articles that are in press following the journal name.

Abbreviate the names of journals according to *Pub Med* or *BIOSIS Database*. Spell out names of unlisted journals. Supply inclusive page numbers. Submitted manuscripts, manuscripts in preparation, unpublished observations, personal communications, and preliminary report citations must appear parenthetically in the text. They should not appear in the Reference section. See examples below:

Journal style guides and Endnote style files for the *Journal of Clinical Investigation* and *New England Journal of Medicine* – are also acceptable.

Journal Articles

1. Yalow, R.S., and Berson, S.A. 1960. Immunoassay of endogenous plasma insulin in man. *J. Clin. Invest.* 39:1157-1175.

In Press

2. Gardner, W., and Schultz, H.D. 1990. Prostaglandins regulate the synthesis and secretion of the atrial natriuretic peptide. *J. Clin. Invest.* In press.

Complete books

3. Myant, N.B. 1981. *The Biology of Cholesterol and Related Steroids*. London: Heinemann Medical Books. 882 pp.

Articles in books

4. Innerarity, T.L., Hui, D.Y., and Mahley, R.W. 1982. Hepatic apoprotein E (remnant) receptor. In *Lipoproteins and Coronary Atherosclerosis*. G. Nosedá, S. Fragiacomó, R. Fumagalli, and R. Paoletti, editors. Amsterdam: Elsevier/North Holland. 173-181.

Abstracts

5. Packman, C.H., Rosenfeld, S.I., and Leddy, J.P. 1981. Inhibition of the C8/C9 steps of complement lysis by a high density lipoprotein (HDL) of human serum. *Fed. Proc.* 40:967a. (Abstr.)

11. **Figure References and Legends.** Figures must be cited sequentially in the text using Arabic numerals (for example, “Fig. 7”). Provide a short title (in the legend, not on the figure itself) and explanation in sufficient detail to make the figure intelligible without reference to the text (unless a similar explanation has been given in another figure). Provide a key to any symbols used.
12. **Tables.** All tables should be double-spaced on manuscript pages. Tables should be self-contained and self-explanatory. Provide brief titles and use superscript capital letters starting from A and continuing in alphabetical order for footnotes.

NOTE: **For Bound Copy:** The full thesis title, the student’s full name, "Yale University", and the year of degree should be imprinted on the cover. An abbreviated title, students name and year should be imprinted on the spine.

a. Thesis Typing and Assembly Instructions

The final submission of the M.D. thesis should meet the following requirements:

Paper: 20 lb. weight paper of good quality (standard copy paper). All pages must be a high-contrast, dark image on white paper.

Print Size: Use a 10-12 point font.

Typing: Double spaced on one side of the page. Single spacing may be used within block quotations, footnotes, and bibliography, but double spacing must be used between successive entries.

Margins: 1-1/2 inch left hand margin (normally, the binding edge), 1 inch on the three other edges. These margins apply to full-page photographs and pages containing tables and illustrations, as well as to pages of text.

Figures: Ordinarily, photographs should be scanned and entered electronically into the text. To mount photographs, use Duco or equivalent cement, rubber cement or “permanent” glue. Regular glue, picture corners, and adhesive cellophane are not acceptable. If charts, graphs, maps, tables, or computer printouts that are larger than the standard size are to be used, they should be folded carefully into the manuscript, with the fold at least 1/2 inch from the right hand edge of the page.

Figure Legends should be detailed and should be placed below the illustrative material.

A legend may appear, however, on a facing legend page when both illustration and the legend cannot be accommodated on one page.

Page Numbers: Each page in the thesis should be numbered except the title page, table of contents, abstract, and acknowledgements. The number should be placed either at the top center or at the top right hand corner at least 1/2 inches from any edge.

Submission of Thesis:

A. Hard Bound Copies (3). The Office of Student Research requires one letter-quality printed original thesis with hard bound cover, any color, submitted to our office (ESH 310), one copy for the department chair's office and one copy for your advisor (in some departments, these copies are optional. Please check with the Department Thesis Chair and your advisor. These additional copies may be bound with soft covers). The copies should be reproduced on a good copying machine. **Allow at least two weeks for copying and binding of your thesis.** **Bound Copy:** The full thesis title, the student's full name, "Yale University", and the year of degree are imprinted on the cover. An abbreviated title, students name and year are imprinted on the spine.

Abstracts:

The abstract should be placed immediately after the title page. A copy of the abstract may also be requested to *The Yale Journal of Biology and Medicine*. See section on "Abstracts of M.D. Thesis" for more detailed information.

The Office of Student Research has a list of copying and binding services. **Allow at least two weeks for copying and binding of your thesis.**

Typing and Binding Costs:

The cost of typing and binding of the dissertation is the responsibility of the student. Departmental or research funds should not be used for this purpose.

B. Digital Copy (1), Yale Medicine Thesis Digital Library. The Office of Student Research also requires a copy of your thesis to be submitted to the Yale Medicine Thesis Digital Library. A completed agreement form covering both the hard bound and digital thesis is available in the Office of Student Research. A copy of the agreement is on page 27. Instructions on the submission of the digital thesis are on page 28.

Title Page Format:

(Full Title of Dissertation)

A Thesis Submitted to the
Yale University School of Medicine
in Partial Fulfillment of the Requirements for the
Degree of Doctor of Medicine

by

(Legal name of author)

(Year of degree)

b. Yale Medicine Digital Thesis Library

**Yale School of Medicine
MD Thesis Depositor's Declaration**

I hereby grant to the Yale School of Medicine the non-exclusive license to photocopy, archive and make accessible, under the conditions specified below, my print and electronic thesis, in whole or in part, in all forms of media.

I agree that the Yale School of Medicine may electronically store, copy or translate my thesis to any medium or format for the purpose of preservation and accessibility. The Yale School of Medicine is not under obligation to reproduce or display my thesis in the same format in which it was originally deposited.

I retain all ownership rights to the thesis, including but not limited to the right to use in future works (such as articles and books) all or part of this thesis.

My thesis may be placed in the digital thesis repository with the following status: **(choose one only)**

- 1.** Release the entire thesis immediately for access worldwide, in perpetuity.
- 2.** Release the entire work for Yale University access (including on-campus access and remote access) only for 1 year, 2 years, or 3 years. After this time, the work may be accessible worldwide, in perpetuity.
- 3.** Release the entire work for Yale University access (including on-campus access and remote access) only, in perpetuity. I understand that this thesis may be available from any Yale University computer location or authorized remote location.

I understand that descriptions of the thesis will be incorporated into library catalogs or databases. Any request to remove my thesis from the digital library repository shall be submitted in writing to the Director of the Office of Student Research. Such request shall be granted or denied at the sole discretion of the Director.

I hereby give The Yale School of Medicine the right to make available the thesis as described above.

Name of Student

Signature

Date

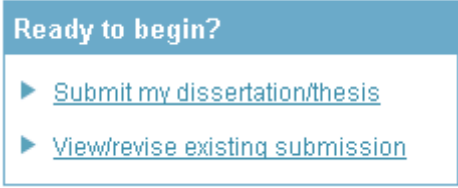
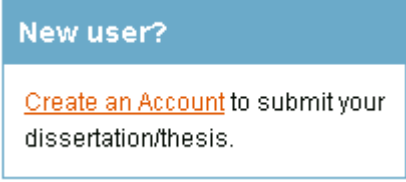
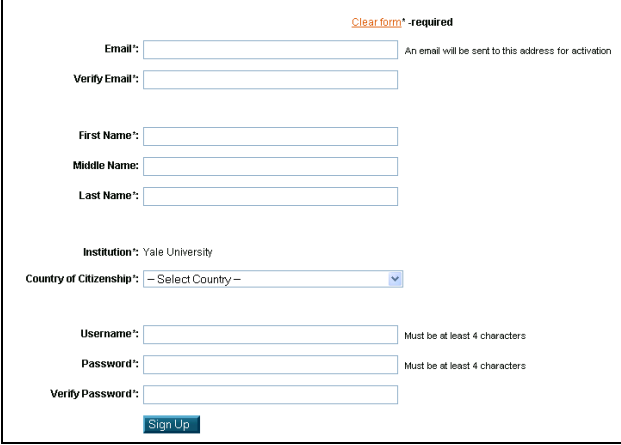
Year of Graduation

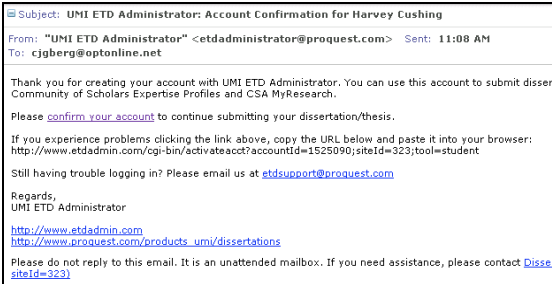
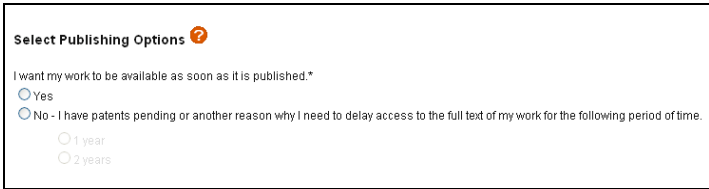
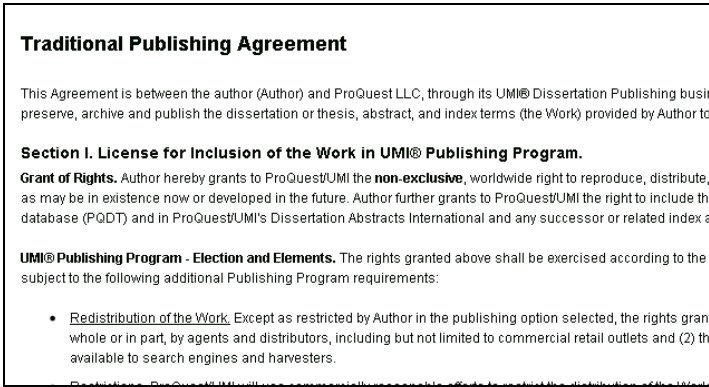
The Thesis should be uploaded after approval by the Departmental Thesis Chair

Instructions for Uploading a PDF version of a Medical Thesis

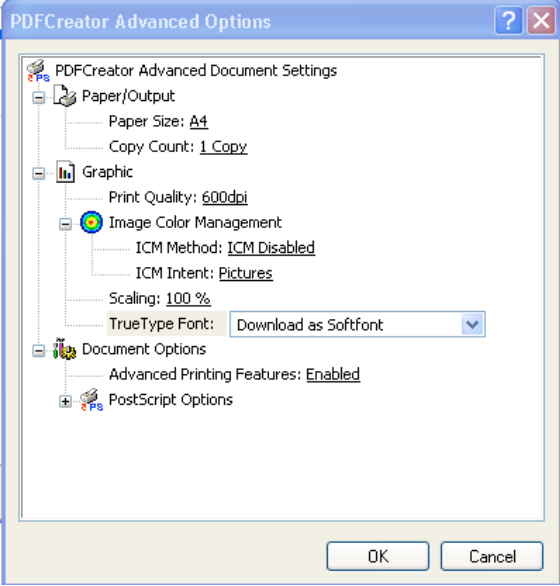
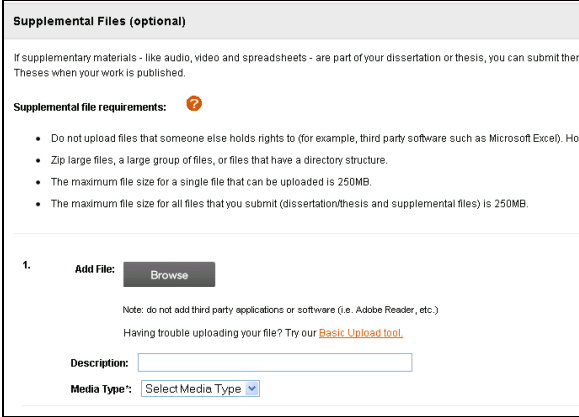
For help creating a single file, PDF version of your thesis, please contact your personal librarian. <http://tinyurl.com/ysm-plib>


Logging In: <http://www.etdadmin.com/medicine.yale>

1.	http://www.etdadmin.com/medicine.yale	Use the login page to manage your YMTDL submission process. Bookmarking this page is recommended.
2.		Click on the link to submit your MD thesis.
3.		Then click you the link to create an account.
4.		Write down the combination you create. (Do not use your Net ID and Net ID password, as this information will exist permanently on a non-Yale server and be subject to unknown security risks). Your password must be at least four characters long , cannot start with @, end with %, and cannot match your username.

<p>5.</p>	 <p>Subject: UMI ETD Administrator: Account Confirmation for Harvey Cushing From: "UMI ETD Administrator" <etdadministrator@proquest.com> Sent: 11:08 AM To: cjbberg@optonline.net</p> <p>Thank you for creating your account with UMI ETD Administrator. You can use this account to submit Dissertation Abstracts International, Community of Scholars Expertise Profiles and CSA MyResearch.</p> <p>Please confirm your account to continue submitting your dissertation/thesis.</p> <p>If you experience problems clicking the link above, copy the URL below and paste it into your browser: http://www.etdadmin.com/cgi-bin/activateacct?accountId=1525090;siteId=323;tool=student</p> <p>Still having trouble logging in? Please email us at etdsupport@proquest.com</p> <p>Regards, UMI ETD Administrator http://www.etdadmin.com http://www.proquest.com/products_umi/dissertations</p> <p>Please do not reply to this email. It is an unattended mailbox. If you need assistance, please contact Dissertation Support</p>	<p>You will receive an email confirmation that must be responded to before you can continue your thesis record and deposit. Click on Confirm your Account.</p>
<p>6.</p>	 <p>Select Publishing Options ?</p> <p>I want my work to be available as soon as it is published.*</p> <p><input checked="" type="radio"/> Yes</p> <p><input type="radio"/> No - I have patents pending or another reason why I need to delay access to the full text of my work for the following period of time.</p> <p><input type="radio"/> 1 year</p> <p><input type="radio"/> 2 years</p>	<p>Select Publishing option for your relationship with UMI. Your signed Yale MD Thesis Depositor Declaration will be the effective control for the local Yale digital copy that will be maintained on a Yale Library server with either restricted or public access.</p>
<p>7.</p>	 <p>Traditional Publishing Agreement</p> <p>This Agreement is between the author (Author) and ProQuest LLC, through its UMI® Dissertation Publishing business, to preserve, archive and publish the dissertation or thesis, abstract, and index terms (the Work) provided by Author to ProQuest/UMI.</p> <p>Section I. License for Inclusion of the Work in UMI® Publishing Program.</p> <p>Grant of Rights. Author hereby grants to ProQuest/UMI the non-exclusive, worldwide right to reproduce, distribute, and make available the Work in ProQuest/UMI's Dissertation Abstracts International and any successor or related index or database (PQDT) and in ProQuest/UMI's Dissertation Abstracts International and any successor or related index or database (PQDT) and in ProQuest/UMI's Dissertation Abstracts International and any successor or related index or database (PQDT).</p> <p>UMI® Publishing Program - Election and Elements. The rights granted above shall be exercised according to the subject to the following additional Publishing Program requirements:</p> <ul style="list-style-type: none"> Redistribution of the Work. Except as restricted by Author in the publishing option selected, the rights granted to ProQuest/UMI shall include the right to reproduce, distribute, and make available the Work in ProQuest/UMI's Dissertation Abstracts International and any successor or related index or database (PQDT) and in ProQuest/UMI's Dissertation Abstracts International and any successor or related index or database (PQDT). 	<p>Accept the Traditional Publishing Agreement offered by ProQuest/UMI. In addition, through the Yale Thesis Depositor Declaration you submit in the Office of Student Research, there will be a copy available to a researcher that does not require payment, which you can choose to restrict to campus access only or release publically.</p>

<p>8.</p>	<div data-bbox="358 233 1068 688"> <p>Contact Information</p> <p>Please enter your contact information. This information will be used to process your submission.</p> <p>Required fields are marked with an asterisk (*).</p> <p>First Name*: <input type="text" value="Harvey"/></p> <p>Middle Name: <input type="text"/></p> <p>Last Name*: <input type="text" value="Cushing"/></p> <p>Country of Citizenship*: <input type="text" value="United States"/></p> <p>Institution*: <input type="text" value="Yale University"/></p> <p>Permanent email address*: <input type="text" value="cjbberg@optonline.net"/> <small>Enter permanent email address, not your institution email address.</small></p> <p>Country code (outside US) Area code Phone Extension</p> <p>Phone Number: <input type="text" value="1"/> <input type="text"/> <input type="text"/> <input type="text"/></p> <p>Fax Number: <input type="text" value="1"/> <input type="text"/> <input type="text"/> <input type="text"/></p> </div>	<p>Please complete the contact information necessary to maintain contact with UMI/Proquest and receive potential royalty payments.</p>
<p>9.</p>	<div data-bbox="358 890 1062 1262"> <p>Title*: <input type="text" value="Neurosurgical approaches to brain tumor removal"/></p> <p>Year Manuscript Completed*: <input type="text" value="2011"/></p> <p>Degree/Department Information:</p> <p>Year Degree Awarded*: <input type="text" value="2011"/></p> <p>Degree Awarded*: <input type="text" value="Doctor of Medicine (M.D.)"/></p> <p>Department*: <input type="text" value="Yale School of Medicine"/></p> <p>Advisor/Committee Chair*: <small>Enter your primary advisor(s), not your entire committee. Do not include degrees as part of the name.</small></p> <p>First Name: Middle Initial: Last Name:</p> <p><input type="text" value="Dennis"/> <input type="text" value="D"/> <input type="text" value="Spencer"/></p> </div>	<p>On the next screen, fill in as much basic descriptive information about your thesis as possible, including the thesis abstract and subject keywords. The subject keywords will be reviewed and standardized to NLM MeSH subject headings prior to public release.</p>
<p>10.</p>	<div data-bbox="358 1398 1065 1766"> <p>PDF</p> <p>You must upload your work as a PDF. If you don't have a PDF file yet, you can convert your manuscript to PDF using the conversion tool we provide.</p> <p>Other PDF Requirements: </p> <ul style="list-style-type: none"> • Fonts must be embedded. • Security settings must be set to "No security". Encrypted files cannot be processed for publishing. • The maximum file size that can be uploaded is 250MB <p>PDF: <input type="button" value="Browse"/></p> <p>Having trouble uploading your file? Try our Basic Upload tool.</p> <p><input type="button" value="Save & Continue"/></p> </div>	<p>On the following upload screen, note that “fonts must be embedded”.</p>

<p>11.</p>		<p>The built-in Macintosh PDF creator software defaults to embedded font information.</p> <p>The default setting for Acrobat Professional is to embed fonts.</p> <p>You can also create a personal account at www.adobe.com and do PDF conversion online.</p> <p>If you use the Windows free recommended PDFcreator application (http://sourceforge.net/projects/pdfcreator/), you will have to do an advanced options selection to Download as Softfont to embed font instructions in your output PDF file.</p>
<p>12.</p>		<p>The next screen will allow you to upload supplemental files. You will be advised not to upload copyrighted documents or applications, and the size limit for individual items is limited to 250 MB.</p>
<p>13.</p>		<p>The next screen will allow you to provide information to those reviewing your</p>

	<div data-bbox="412 96 1005 420"> <p>Notes to Administrator (optional)</p> <p>Include any notes you have for the administrator at your graduate school who will be reviewing your submission. If you will be unreachable via email, note the best way to contact you here as well.</p> <hr/> <p>Notes to Administrator: Clear</p> <div style="border: 1px solid black; height: 40px; width: 150px;"></div> <p>(Maximum characters: 200)</p> <p>Save & Continue</p> </div>	<p>submission. 200 characters maximum.</p>
<p>14.</p>	<div data-bbox="358 453 1062 852"> <p>Register U.S. Copyright</p> <p>At ProQuest, we make copyright registration easy - by submitting your application to the United States Office of Copyright on your behalf and providing you with the cost of your copyright via ProQuest is the fastest and most efficient method currently available.</p> <p>How to take advantage of our copyright service: Registering with the U.S. Office of Copyright establishes your claim to the copyright for your dissertation/thesis and provides certain protections if your copyright is infringed. ProQuest Publishing will act on your behalf as your agent with the United States Copyright Office and apply for copyright registration as part of the publishing process.</p> <p>We will:</p> <ul style="list-style-type: none"> • Prepare an application in your name • Submit your application fee • Deposit the required copy or copies of the manuscript • Mail you the completed certificate of registration from the Library of Congress <p>1. Previous U.S. Copyright Registration Has registration for your published dissertation/thesis, or for an earlier version of the manuscript, been made with the Copyright Office?</p> <p><input type="radio"/> Yes - copyright was previously filed <input type="radio"/> No</p> <p>2. Requesting ProQuest/UMI to file for U.S. Copyright Registration</p> </div> <p><u>There is no fee for the basic electronic upload of your thesis.</u> However, UMI/Proquest is offering to register your copyright for a fee, currently \$55. This is a personal decision to use their service, and no reimbursement from the Office of Student Research or the Medical Library is available. To decline the service, you must respond NO.</p>	<p>According to the U.S. Copyright Office at the Library of Congress, "Copyright protection subsists from the time the work is created in fixed form..." No publication or registration or other action in the Copyright Office is required. There are, however, certain definite advantages to registration. Registration may be made at any time within the life of the copyright, but many registration rights will only be valid if you do it within the first three months of publication.</p>
<p>15.</p>	<div data-bbox="358 1268 1062 1625"> <p>Order Copies</p>  <p>Producing copies of your dissertation/thesis is least expensive at the time of publication. Share in these savings by taking advantage of this discount.</p> <p>Order the "milestone edition" copies of your work:</p> <ul style="list-style-type: none"> • for handy reference • for family, colleagues and faculty • for your personal library <p>Each volume is rendered with respect for the scholarly research, featuring:</p> <ul style="list-style-type: none"> • Brilliant white 32 lb. paper stock: acid-free and archival-grade, this photographic-quality stock is brighter and more opaque for better ink contrast. • Any color graphics included in the digital copy of the thesis received by ProQuest/UMI can now be reproduced in color—at no extra charge! For as they were provided electronically. • Durable hardbound copies are 8½"x11" with elegant black covers made from 2.5 mm-thick board covered in washable linen. Titles are embossed and generous margins enable volumes to be opened flat. </div>	<p>Proquest also provides an optional service to print and deliver your thesis. If you order copies through Proquest, <u>they cannot be shipped directly to the Office of Student Research.</u> You must appear with your bound copy and completed Yale Thesis Depositor Declaration at the Office of Student Research in person.</p>

16.

Submit

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After you submit, you cannot revise your submission without permission from your graduate school administrator. Please verify that your submission is complete and correct before submitting.

Submission Summary:

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Degree: Doctor of Medicine (M.D.)

Title: Neurosurgical approaches to brain tumor removal

Abstract: John F. Fulton's biography of his mentor and friend, Harvey Cushing, was the first book-length biography of the great neurosurgeon and teacher and has remained the standard source on his life. When Cushing died in 1939, he left funds in his will for his wife and Fulton, his literary executor, to compile a biography if they "feel that the publication of my biography may be of interest or help to medical students." Copiously illustrated with photographs and Cushing's own drawings, Harvey Cushing: A Biography was published for the Historical Library in 1946 and dedicated to Cushing's wife, Kate Crowell Cushing.

Subject Categories: Health Sciences, Medicine and Surgery [0564] - primary
Health Sciences, Rehabilitation and Therapy [0382]

Keywords: brain
salad
surgery

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The final deposit step is to review all of your choices and optionally re-enter the system at an earlier stage. **If everything appears in order according to the choices you intended, then click to submit.** If you have second thoughts after hitting submit, please contact the local YSM Administrator Charlie Greenberg(charles.greenberg@yale.edu). If Charlie is not available, please contact the staff at the Office of Student Research.

c. Abstracts of M.D. Theses

Some abstracts of Yale medical student theses are published in *The Yale Journal of Biology and Medicine*. A standardized format for the abstract of each M.D. thesis is required (see the following instructions on page 35). **This format must be followed for all abstracts published both in the bound thesis, in the digital copy (Yale Medical Thesis Digital Library) and in the abstract submitted for publication.**

The editors of *The Yale Journal of Biology and Medicine* will not review abstracts for content. It is the responsibility of the student investigator and the faculty advisor to prepare the abstract. Faculty sponsors give approval of the abstract when they approve the final version in the bound thesis. The editors of the Digital Thesis Library will ensure that all requested thesis abstracts are available to the *Yale Journal of Biology and Medicine* without additional steps required of students.

Digital publication of theses insures access for all scientists to a summary of such work, provides students with a formal citation for their thesis, and demonstrates the exceptional quality of student research and student-faculty cooperation at Yale.

Instructions for Yale Medical Student Thesis Abstracts:

**** These instructions for preparing abstracts are to be used for the bound thesis, the digital library copy, and publication of abstracts in *The Yale Journal of Biology and Medicine*.**

1. Abstracts may be typed or printed by word processor on standard 8 1/2" x 11" white paper with 1-1/2 inch left hand margin (normally, the binding edge), 1 inch on the three other edges. Abstracts may be no more than 500 words in length, not including title and author information. Entire abstract including title page must be double-spaced and should be no more than one page at length.
2. Titles should be brief, clear and carefully chosen. The title should not exceed 100 characters including spaces between words. Capitalize entire title, using no abbreviations.
3. Authors' names are to be written in full, omitting degrees. The student author's name shall be first. If the faculty sponsor also qualifies as an author, his or her name should be last. If the faculty member has been only a sponsor, his or her name should appear in parentheses after the name(s) of other authors as follows: "(Sponsored by...)". Other collaborators should be listed after the student's name and before the faculty sponsor's name. Immediately following the faculty sponsor's name, designate section (if any), departmental affiliation, institution, city and state (Yale University School of Medicine, New Haven, CT (see examples).
4. For thesis work done at another institution, designate senior author's departmental and institutional affiliation. In parenthesis, indicate Yale faculty sponsor and institutional affiliation with the phrase: "Sponsored by..." (see examples).
5. Organize the body of abstract as follows:
 - A statement of the hypothesis and specific aims of the study.
 - A statement of the methods used.
 - A summary of the results presented in sufficient detail to support the conclusions. Include actual values with statistics, if appropriate.
 - A statement of the conclusions reached.
 - Do not use subtitles; e.g., methods, results.
6. Do not include graphs, references to other publications, or acknowledgement of any research grant support. A single short table of results can be used if appropriate.
7. Abbreviations may be used in text only if defined initially by placing them in parenthesis after the full work first appears in the text. Abbreviations may not be introduced in the title.
8. Non-proprietary (generic) names are required the first time a drug is mentioned, written in small letters. Proprietary names are always capitalized, e.g., acetazolamide (Diamox).
9. Completed abstracts must be approved by faculty advisor.

Examples of Titles and Authors of Abstracts:

- 1) Thesis done at Yale:

INCIDENCE OF SUPRAVENTRICULAR ARRHYTHMIAS IN AN AGING POPULATION.
John M. Smith, Walter T. Donigan, and Marion L. Green. Section of Cardiology, Department of Internal Medicine, Yale University, School of Medicine, New Haven, CT.

- 2) Thesis done at Yale, where faculty advisor is not a co-author:

INCIDENCE OF SUPRAVENTRICULAR ARRHYTHMIAS IN AN AGING POPULATION.
John M. Smith and Walter T. Donigan (Sponsored by Marion L. Green). Section of Cardiology, Department of Internal Medicine, Yale University, School of Medicine, New Haven, CT.

- 3) Thesis done elsewhere:

INCIDENCE OF SUPRAVENTRICULAR ARRHYTHMIAS IN AN AGING POPULATION.
John M. Smith and Walter T. Donigan. Section of Cardiology, Department of Internal Medicine, St. Elsewhere Hospital, Boston University, Boston, MA. (Sponsored by Marion L. Green, Department of Medicine, Yale University School of Medicine).

Thesis Committees

Departmental Thesis Committee:

Each Department Chairperson will appoint a Departmental Thesis Committee of three senior faculty members who will be responsible for approving completed dissertations done within that department. 2011-2012 Departmental Thesis Committee Members are:

Anesthesiology	Dr. David Silverman	Neurobiology	Dr. Michael Schwartz
Cell Biology	Dr. Peter Takizawa	Neurology	Dr. Hal Blumenfeld
Child Study Center	Dr. Andres Martin	Neurosurgery	Dr. Angeliki Louvi
Dermatology	Dr. Robert Tigelaar	Obstetrics & Gynecology	Dr. Joshua Johnson
Diagnostic Radiology	Dr. Kevin Johnson	Ophthalmology	Dr. Z. Jimmy Zhou
Emergency Medicine	Dr. Lori Post	Orthopaedics & Rehabilitation	Dr. Jonathan Grauer
Epidemiology & Public Health	Dr. Elizabeth Claus	Pathology	Dr. Jose Costa
Genetics	Dr. Margretta Seashore	Pediatrics	Dr. Howard Pearson
History of Medicine	Dr. John Warner	Pharmacology	Dr. Titus Boggon
Immunobiology	Dr. Kevan Herold	Physiology	Dr. Biff Forbush
Internal Medicine	Dr. Lloyd Cantley	Psychiatry	Dr. Marc Potenza
Laboratory Medicine	Dr. Peter Tattersall	Surgery	Dr. John Geibel
Molecular Biophysics & Biochemistry	Dr. William Konigsberg	Therapeutic Radiology	Dr. Roy Decker

The Thesis Subcommittee of the Curriculum Committee:

A Thesis Subcommittee of the Curriculum Committee has been formed and meets regularly to recommend policy to the Curriculum Committee for all aspects of the Thesis requirement. Specifically, rules and regulations will be set and deadlines established. The Committee will serve as a reviewing body to determine prizes and guidelines for the awarding of prizes. 2011-2012 Thesis Subcommittee Members are:

Dr. Nancy R. Angoff	Dr. Nancy Kim
Dr. Richard Belitsky	Dr. Marie Landry
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Dr. Dennis Cooper	Dr. Richard Lifton
Dr. Jose Costa	Dr. I. George Miller
Dr. Anne Curtis	Dr. Peter Takizawa
Dr. Thomas Duffy	Dr. John Warner
Dr. John N. Forrest, Jr.	Dr. Bruce Wexler
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Office of Student Research:

The Chairperson of the Thesis Subcommittee has established an office dedicated to student research where lists of faculty research interests are kept up to date; deadlines and applications for stipends are available; where advice can be given to students searching for research projects; where information about past student projects is kept; and where sources of funds can be reviewed. The Office of Student Research is under the direction of Dr. John N. Forrest, Jr. Specific questions about the thesis requirement should be directed to Donna Carranzo, Mae Geter or Dr. Forrest at the Office of Student Research, 3rd Floor Harkness Dorm, 310 ESH, 203-785-6633.