MASTER'S IN TELECOMMUNICATIONS

# 2015–2016
# Graduate Handbook

University of Maryland

# Master's in Telecommunications (ENTS)
# Graduate Handbook
# 2015-2016

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# Message from the Program Office

Greetings, and welcome to the Master's in Telecommunications Program at the University of Maryland! We are excited for another successful year and look forward to assisting you in your academic career.

The Program Office would like to emphasize several things that will help you progress through your graduate studies. First, you should subscribe to the ents-students listserv. To sign-up, send an email to listserv@listserv.umd.edu with the message "subscribe ents-students" <Your Name>" in the body of the email. The listserv is our primary method for disseminating important information to students.

Next, you should carefully read emails that you receive from us via the listserv. If you need clarification, feel free to talk one-on-one with our dedicated staff. We are always looking for the most effective ways to communicate policies, information, and deadlines to you, so please take advantage of all forms of communication with us. And, if at any point you have any questions, email us at

telecomprogram@umd.edu

Also, for students who are seeking a well-rounded experience, we are happy to talk with you about various aspects of graduate student life. We can direct you to resources that may help you achieve a work-life balance. We want you to know that you are a part of a community here that is both close-knit and connected to broader areas such as the University and metropolitan D.C.

Lastly, the Program Office encourages you to take responsibility for your own success. One way to do this is to consult this Handbook as well as the *Graduate Catalog* and, if you are an international student, the International Student and Scholar Services office (ISSS) for information on policies, procedures, and requirements. Bookmark these resources today:

www.telecom.ece.umd.edu/graduate-handbook (ENTS Graduate Handbook)
www.gradschool.umd.edu/catalog (The Graduate School's *Graduate Catalog*)
http://globalmaryland.umd.edu/offices/international-students-scholar-services (ISSS)

Good luck this year. Go Terps!

Sincerely,
Kerrie Moyseenko, Program Coordinator

# Degree Requirements

Requirements to earn the Master's in Telecommunications degree include completing 30 credit hours of course work, achieving a cumulative grade point average (GPA) of at least 3.0, and submitting a satisfactory scholarly paper. The 30 credits include eight required courses and two elective courses. All graduate students at the University of Maryland are required to maintain a 3.0 GPA each semester to remain in good standing.

Prior to the start of their first semester, students are required to obtain mandatory advising from the academic advisor. Students are expected to consult this Handbook in preparation for the advising meeting. Students are not required to obtain mandatory advising after their first semester. More information on advising can be found in the Regulations section.

## Coursework Requirement

Eight **Core Courses** (24 credits) are required for all students:

**Technical Core Courses** (12 credits):
- ENTS 622 Introduction to Digital Communication Systems
- ENTS 640 Networks and Protocols I
- ENTS 641 Networks and Protocols II
- At least one of the following selective core courses:
  - ENTS 653 PCS/AWS System Implementation
  - ENTS 654 Optimization and Analysis of GSM Networks
  - ENTS 656 Introduction to Cellular Communication Networks
  - ENTS 657 Satellite Communications Systems
  - ENTS 665 Advanced Wireless Communications Networks

**Management Core Courses** (12 credits)
- ENTS 625 Management and Organizational Behavior in the Telecommunications Industry
- ENTS 630 The Economics of International Telecommunications Policy and Regulation
- ENTS 632 Telecommunications Marketing Management
- ENTS 635 Decision Support Methods for Telecommunication Managers

Two **Elective Courses** (6 credits) must be chosen from any additional offered ENTS courses (exempting the one selected for the technical core above). The selected elective courses must be taken for a letter grade. Courses may not double count towards a core course and an elective course.

Additional courses beyond the required courses must be approved by the Program Office and should not impede the student's progress towards degree completion. ALL courses taken at the University of Maryland count towards the student's cumulative GPA.

# Scholarly Paper Requirement

All students must write and submit an approved **Scholarly Paper** prior to the end of their final semester to fulfill their degree requirement. Deadlines for all Scholarly Paper requirements and associated graduation paperwork will be announced by the Program Office at the start of each semester. Additional information regarding the Scholarly Paper can be found in Appendix 1.

**Scholarly Paper Workshop Requirement**
At the beginning of each semester, a Scholarly Paper Workshop will be held to review the requirements of the Scholarly Paper. Students are required to attend at least one Scholarly Paper Workshop before submitting their Scholarly Paper. Students are welcome to attend more than one workshop. The Scholarly Paper Workshop will provide an overview of all attributes of the Scholarly Paper and advice on how to develop a successful Scholarly Paper.

**Description**
The Scholarly Paper will demonstrate the student's ability to synthesize technical information in a coherent form. Telecommunications professionals, like most engineers and executives, will inevitably be called upon to compose technical or business documents. The Scholarly Paper is comparable to a "Working Paper" or trade publication.

The Scholarly Paper is not associated with course registration. It would be expected that students complete most of their course work prior to embarking upon the Scholarly Paper so that they have a breadth of knowledge from which they can identify a suitable topic.

Students should begin planning for the Scholarly Paper by the end of their first year. Generally, students will complete the Scholarly Paper during their final semester. Students should submit the appropriate paperwork to the Program Office by the stated deadlines of the semester in which they wish to graduate.

Students choose their own topics. The topic should relate either to the business or engineering aspects of telecommunications. For example, a topic discussed in a course may provide a starting point from which a student may delve deeper; the results of such an inquiry should be suitable for the Scholarly Paper. (Note:  Students will be required to verify that the Scholarly Paper does not overlap with any paper previously submitted for academic purposes.)

After choosing a topic, students must submit the Scholarly Paper Topic Approval Form at the beginning of the semester in which they plan to graduate. Any change in topic will require students to submit a new approval form. Once the paper is completed, students must submit the Scholarly Paper Submission Form during the semester in which they plan to graduate. Please see the Graduation section for specific deadlines and more information. Only papers of the highest quality will be approved. If the paper is not approved, the student will not graduate in the intended semester.

In all academic work including the Scholarly Paper, students are obligated to abide by the University of Maryland Code of Academic Integrity. The scholarly paper must consist of original work by the student. Although a survey of current literature and reading the work of experts is

strongly encouraged, referencing or including another person's work (written text, pictures, diagrams, ideas, etc.) without proper citation constitutes academic dishonesty. For more information about academic integrity, please see the Regulations section below and consult the Office of Student Conduct.

**Guidelines**
- The body of the paper should contain an introduction (background), section(s) on the main concepts (primary content), and a conclusion (summary of findings).
- Once the topic is approved, the student should work independently. Extensive advising should not be required. Joint papers with other students are not permitted.
- The student need not conduct original research. Investigation of the topic using a variety of credible sources should be sufficient. A minimum of three distinct references should be consulted.

**Format**
- The body of the paper should be 5-10 pages in length. (Note: papers with numerous diagrams and images should be closer to 10 pages.)
- The paper should be double-spaced and typed in standard 12-point font
- The body of the paper should properly cite references
- The paper must include a separate title page with a one-paragraph abstract (approximately 50-200 words).
- The paper must include a separate references page. A minimum of three distinct references should be included. All references, including Web references, must be properly listed.

**Advice**
- All acronyms and jargon should be defined when they are first introduced
- The paper must be written in proper English that is grammatically correct and syntactically sound. Students should ensure that their papers are sufficiently proofread and edited prior to submitting them.
- The paper should adhere to a style of proper academic writing and citation. Students should consult and follow IEEE style for the title page, paper, citations and references.
- Papers that display poor writing skills and/or typographical errors will not be accepted nor approved.
- International students in need of writing assistance should contact the English Editing for International Graduate Students program in advance of submitting their papers.

# Variations on Degree Requirements

**Exemptions**
Students who already have the requisite background covering core course material may request to be considered for a core course exemption. An approved core course exemption request would allow the student to replace a core course with an advanced ENTS elective course. Up to two core course exemptions can be approved routinely, as long as all complete and relevant information is provided and available. For three or more exemptions, some additional

justification and review may be required.

**Substitutions**
Students who have special interests may request to be considered for a course substitution. An approved course substitution request would allow the student to substitute a non-ENTS course for one of the elective courses. A maximum of one substitution may be approved.

Exemptions and substitutions may be considered if there is compelling reason and if the proposed plan of study is still coherent and in compliance with all Program and Graduate School policies. Please see the Regulations section for more information.

**Placement Exams**
Placement exams are offered once per year, in August, for the following technical core courses:

> ENTS 622 Introduction to Digital Communication Systems
> ENTS 640 Networks and Protocols I

A passing mark on the placement exam will exempt a student from completing the corresponding technical core course. If a student does not pass the placement exam(s), they are expected to enroll in either or both of the core courses. If a student does not take the placement exam(s), they are expected to enroll in either or both of the core courses.

Students are only offered one opportunity to take the placement exams. For students who begin the program in the Fall, they are only eligible to take the placement exams in the August prior to their first semester. For students who begin the program in the Spring, they are only eligible to take the placement exams in the August after their first semester. Dates of the placement exams will be announced on the ENTS website.

A passing mark on the placement exam(s) satisfies the core course prerequisite requirement for an upper level elective course. See the "Prerequisites Requirements" in the Regulations section for more information.

# Regulations

The following sections describe policies and procedures that pertain to you as a graduate student in the Master's in Telecommunications Program. Some of these policies are internal to the Program, and some are Graduate School policies. All policies must be followed in order for students to maintain good standing in the program.

Please note that students who require an advisor's approval signature on university or external documents should see the Program Office.

## Advising

All students are required to obtain mandatory advising with the academic advisor prior to the start of their first semester. Students are expected to consult this Handbook in preparation for the advising meeting. Students are not required to obtain mandatory advising after their first semester.

It is highly recommended that students meet with their academic advisor prior to the start of each semester to make sure that they are on track with their course selections and to select course work that is complimentary to their career goals.

## Registration Schedule & Blocks

The registration timeline will be announced prior to final exams each semester. The "mandatory advising" block will be lifted by the Program Office according to the registration schedule that is announced each semester. The ENTS registration schedule does not necessarily coincide with the university's registration timeline.

Students may have additional registration blocks on their account beyond the department's "mandatory advising" block. The Program Office cannot see these blocks or lift them. Students are expected to check with those respective departments (Health Center, Bursar, Graduate School, etc.) prior to the opening of registration in order to meet requirements to have those blocks cleared. It is the responsibility of the student to know what is required for their blocks to be lifted.

## Registration Policies

Below are policies pertaining to registration. Some policies stipulated by the Graduate School have been excerpted here for your reference. For full-text of all Graduate School policies, please see the *Graduate Catalog* at http://www.gradschool.umd.edu/catalog

### Deadlines
Registration for classes must take place no later than one day prior to the start of the semester. Students are required to abide by all deadlines and procedures posted in the University *Schedule of Classes* regarding registration, schedule adjustment, and graduation. See

Students are also expected to abide by all deadlines announced in print and/or digital form by the Program Office.

**Three Course Maximum Registration**
It is program policy that ENTS students register for no more than three (3) courses in a given semester. If a student wishes to enroll in four courses, after their first semester, the student must seek approval PRIOR to registering for four courses. Approval includes submitting an ENTS Petition of Regulation Waiver Form, signed by the academic advisor, to the Program Office. Students who are enrolled in more than three courses without permission will be automatically dropped from all courses.

**Prerequisites Requirements**
All students must meet the prerequisites for an upper-level course as stated in the Course Descriptions. The stated prerequisites must be completed PRIOR to enrolling in the course that requires the prerequisites. Prerequisites may not be completed simultaneously with the upper-level course. Students may submit an ENTS Petition of Regulation Waiver Form to the academic advisor if they believe they are exempt from stated prerequisites. This petition may be approved or denied at the discretion of the academic advisor. If a student is enrolled in an upper-level course that requires prerequisites and he/she has not met such requirements, that student will be automatically dropped from the course.

**Continuous Registration Requirements**
From the *Graduate Catalog*: http://www.gradschool.umd.edu/catalog/registration_policies.htm
> All graduate students must register for courses and pay associated tuition and fees each semester, not including summer and winter sessions, until the degree is awarded.
> A student who fails to register and who has not requested and received a waiver of registration or "Leave of Absence for Childbearing, Adoption, Illness or Dependent Care" will be notified by the Graduate School after the first day of classes that he or she must register for the current semester. The Graduate School will also inform the Graduate Director of the graduate program that the student is in jeopardy of termination. If the student does not register, he or she will be dismissed from the Graduate School at the end of the semester for failure to comply with the continuous registration requirement.
>
> A student who is dismissed for non-registration may appeal dismissal during a 30-day period following the end of the semester of non-registration. If the student does not appeal, or if the appeal is denied, and the student wishes to continue in the Graduate School, the student must apply for readmission. In this case, readmission does not alter the initial requirements for time to complete the degree or advance to candidacy.

**Waiver of Registration for Master's Students**
Students who need to take temporary leave from the university must request a waiver of continuous registration and should consult with the Program Office. The Petition for Waiver of Continuous Registration Form should be submitted to the Program Office. Graduate School forms can be found on the Graduate School's Web site:

It is important to note that the waiver of continuous registration, if granted, does not take into account a student's immigration status. Therefore, students on F-1 visa must also consult with the International Student & Scholar Services office (ISSS) regarding any interruption of registration before filing the waiver.

From the *Graduate Catalog*: http://www.gradschool.umd.edu/catalog/registration_policies.htm

> Certificate, Master's, and pre-candidacy Doctoral students who will be away from the University for a semester or a year may request a waiver of continuous registration and its associated tuition for the semester or year. Waivers of registration will be granted only if the student is making satisfactory progress toward the degree and can complete the degree requirements within the required time limits. Interruption of registration cannot be used to justify a time extension.
>
> Permission for non-registration is obtained from the Graduate Director of the student's program and the waiver must be filed with the Graduate School. Students who are not registered may not use any University facilities, including the library, and should expect to consult with members of the Graduate Faculty seldom or not at all.
>
> A request for a waiver of registration should be filed 30 days before the beginning of the semester or year for which the waiver is sought. Tuition waiver requests will be granted only when the student affirms in writing that he or she will not be using any University resources, including the time of faculty members, during the waiver period.

**Designation of Full-Time and Part-Time Status**

Students who need to maintain full-time registration are responsible for calculating their status each semester. International students must maintain full-time registration and should consult with the Office of International Services (OIS) to ensure compliance with immigration regulations.

From the *Graduate Catalog*:  http://www.gradschool.umd.edu/catalog/registration_policies.htm

> The Graduate School uses a unit system in making calculations to determine full-time or part-time student status. Please note that graduate units are different from credit hours.
>
> The number of graduate units per credit hour is calculated in the following manner:
> * Courses in the series: 000-399 carry 2 units per credit hour.
> * Courses in the series: 400-499 carry 4 units per credit hour.
> * Courses in the series: 500-599 carry 5 units per credit hour.
> * Courses in the series: 600-897 carry 6 units per credit hour.
>     […]
> To be certified as full-time, a graduate student must be officially registered for a combination of courses equivalent to 48 units per semester. Graduate assistants holding regular appointments have full-time status if they are registered for at least 24 units in addition to the assistantship; holders of half-time assistantships are considered full-time if registered for 36 units. Audited courses do not generate graduate units and cannot be used

in calculating full-time or part-time status.

**Leave of Absence for Childbearing, Adoption, Illness or Dependent Care**
From the *Graduate Catalog*: http://www.gradschool.umd.edu/catalog/registration_policies.htm
> In recognition of the effects that childbirth, adoption, illness, and caring for incapacitated dependents (such as children, ill or injured partners, or aging parents) may have on the time and energy that graduate students have to devote to their educational programs, the University allows students in such circumstances to apply for a leave of absence of up to two semesters during which time they do not intend to make academic progress toward the completion of their degree. The time taken on an approved leave of absence is not included in the time limitations for degree completion and advancement to candidacy.

See the *Graduate Catalog* for more information, and consult with the Program Office should you need to apply for a leave of absence.

# Waiver of Regulation (ENTS)

Students seeking a waiver of ENTS regulation must submit the appropriate form and supporting documentation to the Program Office. Waivers of regulation include: (a) request for core course exemption; b) request for course substitution; and c) petitions.

**(a) Core Course Exemption**
This policy applies only to the following core courses: ENTS 641, ENTS 625, ENTS 630, ENTS 632, and ENTS 635. Please note that new students entering in fall may be eligible to gain exemption from core courses ENTS 622 and/or ENTS 640 by passing a placement exam before the start of their first semester. The Program Office will announce information to new students regarding placement exams.

Students who believe they have already covered the material in an ENTS core course during their previous education may submit a request for Core Course Exemption. The following documents will be required for each core course exemption request:
1. Completed ENTS Core Course Exemption Request Form
2. Official transcript from an accredited institution showing a B or better in the relevant class either in your file or attached to the form
3. In some cases, a course description or detailed syllabus may be requested

Students approved for core course exemption are still required to complete the mandatory 30 credits for graduation. All core course exemptions must be replaced by more advanced ENTS electives. Generally, technical core courses must be replaced by technical electives; management core courses must be replaced by similar electives. All replacement courses must be approved prior to registration.

Students should submit the complete request to the Program Office no later than one week prior to the semester in which the exemption applies. The exemption must be approved prior to the start of the semester. Up to two core course exemptions can be approved routinely, as long as all

complete and relevant information is provided and available. For three or more exemptions, some additional justification and review may be required.

**(b) Course Substitution**
Students who wish to take a non-ENTS course may submit a request for Elective Course Substitution. The following documents will be required:

> Completed ENTS Elective Course Substitution Request Form
> Official course description and, if available, detailed syllabus

Students should ensure that they have the background and prerequisite knowledge to undertake the proposed course. Students approved for elective course substitution are still required to complete the mandatory 30 credits for graduation. A maximum of one elective course substitution is permitted. The elective course may be replaced by an approved non-ENTS course. All substitution courses must be approved by the Program Office prior to registration. If approved, students are responsible for obtaining permission to register from the department offering the course.

Students must submit the complete request to the Program Office no later than one week prior to the start of the semester in which they intend to take the course. If the substitution is not approved prior to the start of the semester, then the non-ENTS course is not authorized to count towards the degree.

Students taking unauthorized courses will be considered out of good standing and are subject to dismissal from the Program.

**(c) Petitions**
Students who have compelling reason and appropriate documentation to seek an exception to policy may do so by submitting a petition. The petition should concisely state the relevant policy and the exception needed as well as the reasons why the student feels he/she should be granted the exception.

Program policies include all policies stated herein as well as policies, procedures, and deadlines announced in print and/or digital form by the Program Office. Students should submit the completed ENTS Petition for Waiver of Regulation Form with any supporting documents to the Program Office for review.

Requests for exceptions to Graduate School regulations must be submitted to the Program Office with the appropriate Graduate School form and within processing time of the Graduate School deadline. Graduate School regulations are detailed in the *Graduate Catalog*. Graduate School forms can be found on the Graduate School's Web site:
http://www.gradschool.umd.edu/index.php/current_students/general_forms_for_graduate_students/

## Transfer of Credit

Students who wish to transfer credits from another institution must obtain approval first from the Program Office.  The Request for Transfer or Inclusion of Credit for the Master's Degree Form and the official transcript should be submitted to the Program Office.  Graduate School forms can be found on the Graduate School's Web site: http://www.gradschool.umd.edu/index.php/current_students/general_forms_for_graduate_students/

Students requesting transfer of credit may also wish to request core course exemption at the same time.  These students should consult with the Program Office.
From the *Graduate Catalog* (http://www.gradschool.umd.edu/catalog):

All graduate study credits offered as transfer credit must meet the following criteria:

- No more than six credit hours of graduate work may be transferred from another institution, unless the program has special approval by the Graduate Council. When changing programs within the University of Maryland, the student may request inclusion of credits earned at the University of Maryland. When moving from non-degree to degree-seeking status, Advanced Special Students may transfer up to twelve (12) graduate credits to the degree program, subject to the approval of the Graduate Program.
- The advisor and Graduate Director will need to certify that transfer courses are applicable to the student's program and, for non-University of Maryland courses, that the courses have been revalidated.
- Credit must have been granted by a regionally accredited U.S. institution or foreign university. If the latter, evaluation by the staff of the International Education Services and the Graduate School is required.
- The courses must be graduate level and have been taken for graduate credit at the original institution.
- The student must have earned a grade of "B-" or better in the course.
- The credit must not have been used to satisfy the requirements for any other degree.
- The student must furnish an official transcript to the Graduate School.
- Transfer work satisfies only the 400-level requirements for the master's degree and does not apply to the upper-level requirements.
- The transfer course work must have been taken within seven years of the award of a University of Maryland master's degree for which the student is currently enrolled (all other course work must be taken within five years of the award of master's degree.)

## Incomplete Grades
From the *Graduate Catalog* (http://www.gradschool.umd.edu/catalog):

An incomplete is a mark that an instructor may award to a student whose work in a course has been qualitatively satisfactory, but who is unable to complete some portion of the work required because of illness or other circumstance beyond the student's control. In awarding the mark of "I" for graduate courses other than 799 and 899, instructors must fill out an "Incomplete Contract for Graduate Students." The contract will specify the

work remaining to be completed. It must be signed by the instructor and the student and maintained by the department offering the course. The student is responsible for providing a copy of the contract to the director of graduate studies in his or her program.

The mark of incomplete in 500-, 600-, 700-, and 800-level courses will not automatically roll-over to letter grades. Normally, students are expected to complete courses in which they have received an "I" by a date no more than twelve months from the beginning of the semester in which the course was taken. The mark of incomplete in 400-level courses will be governed by the rules for awarding incompletes to undergraduate students, including the provision of automatically converting an "I" to a letter grade.

Advisors should stay current with their students in urging completion of incomplete grades, and programs should review the status of incompletes in their annual reviews of students' progress toward their degrees. Students will remain in good standing despite marks of incomplete if the courses are not required for their degrees. For courses required for graduation, students will be considered to be making satisfactory progress only if they fulfill the conditions of any outstanding incomplete contracts in a timely manner. An "I" can remain in place on a student's transcript for a maximum of one year.

Departments and programs may specify the maximum number of incomplete credits students may carry, exclusive of credits in 799 and 899.

Students are strongly encouraged to obtain the Graduate School's Incomplete Contract for Graduate Students Form and to initiate the paperwork process with the instructor. Students should ensure that the Terms of the Incomplete Contract (work to be completed and completion date) are clear and specific. Students are responsible for providing a copy of the contract to the Program Office. Graduate School forms can be found on the Graduate School's Web site: http://www.gradschool.umd.edu/current_students/general_forms_for_graduate_students.html

## Telecommunications Lab Rules and Procedures

The following rules and procedures were established to give ENTS students the opportunity to maximize their lab experience. Students who do not abide by these rules will have their lab privileges revoked and may face disciplinary action.

Since these regulations are part of the ENTS Graduate Handbook, all students are responsible for knowing and complying with the rules. Questions or concerns can be addressed to the Program Office.

1. The Telecommunications Lab is ONLY for the use of Master's in Telecommunications Program students. Non-ENTS students are not permitted into the lab without prior permission from the Program Office. The only exception to this is when there is a non-ENTS course held in the lab; during this class time, students enrolled in the course are permitted in the lab.

2. The lab is open to students during times when there is not a scheduled class. During a scheduled course, students are not permitted to knock, enter, or print to the lab. Students must also vacate the lab promptly before the start of a scheduled class and may not return

until the class has ended. The program office will email the lab schedule and post the schedule on the lab door at the beginning of each semester. Lab hours will also be posted on the ENTS website and sent to students via the LISTSERV. Students are responsible for knowing the lab schedule.

3. On occasion, the lab may be closed for special events, make-up lectures, etc. The Program Office will notify students via the LISTSERV of these closures. During these times, students are responsible for adhering to policy item #2 above.

4. When entering the lab, you must use your own student ID card. Entry using another ENTS student's ID card is not permitted.

5. Absolutely no food or drink is permitted in the Telecommunications Lab. All food and beverages must be consumed or discarded prior to entering the lab.

6. The lab door MUST be closed at all times. Please make sure to shut the door behind you when you are entering and exiting.

7. Unless circumstances require otherwise, there should be no more than two people using a workstation at one time.

8. Immediately report any problem with the PCs, printers, monitors, phone to the ECE Helpdesk (1449 AVW; 301-405-3689). Report any issues regarding room conditions to the Program Office.

9. Upper cabinets in the lab are for temporary storage only. You may not leave your belongings overnight.

10. When others are waiting for a computer, please limit your time on the computer to one (1) hour.

11. Do not attempt to install software or other applications on your own. If you need something installed, contact the ECE Helpdesk.

12. The Telecommunications Lab is not a student lounge. If you are in the lab, then you should be working or meeting on academic/professional related activities.

13. Sitting on any item other than chairs is not permitted. Absolutely no sitting on furniture.

14. Students are permitted 50 free pages per month of printing in the lab. If you need more pages, you can purchase more from the ECE Helpdesk. Please note that the LOGIC printer located in the ECE student mailroom (2462 AVW) is always free.

15. Clean up your space before you leave. Do not leave paper, pencils, books, etc. on the floor, on the desks, or anywhere in the lab. Other should find the room as clean as you found it. There are garbage cans located outside the lab.

16. Using the computers for non-academic or inappropriate content is strictly forbidden. If you have any questions regarding what would be considered inappropriate, please contact the Program Office.

17. The phone in the lab may not be used for long distance calls. Personal phone calls should be limited to one (1) minute. Students must maintain a non-disruptive voice while on the call.

18. Students are not permitted to share the voicemail passwords of the Telecommunications Lab phone.

19. If there are other students waiting for the phone, academic/professional phone calls should be limited to three (3) minutes.

20. Students who are working in groups or who are on the phone need to be respectful of other students. Noise levels should be kept to a minimum.

21. Treat the lab with care. Do not abuse or vandalize furniture or equipment.

22. Additional rules and policies may be adopted as necessary. The student body will be notified of any changes via email.

## Academic Integrity

All students are obligated to abide by the University of Maryland Code of Academic Integrity. Students should read and understand all official university policies regarding academic integrity. More information can be obtained from the Office of Student Conduct.
From the *Graduate Catalog* (http://www.gradschool.umd.edu/catalog):

> The University is an intellectual community. Its fundamental purpose is the creation and dissemination of knowledge. Like all other communities, the University can function properly only if its members adhere to clearly established goals and values. Essential to the fundamental purpose of the University is the commitment to the principles of truth and academic honesty. The Code of Academic Integrity is designed to ensure that the principle of academic honesty is upheld. While all members of the University community share this responsibility, The Code of Academic Integrity is designed so that special responsibility for upholding the principle of academic honesty lies with students.

### Penalties for Violations of Academic Integrity

From the *Graduate Catalog* (http://www.gradschool.umd.edu/catalog):

> Students who are found to have falsified, fabricated, or plagiarized in any context, such as course work, laboratory research, archival research, or thesis / dissertation writing, will be referred to the Office of Student Conduct. The Office of Student Conduct has some discretion in determining penalties for violations of the University's standards of academic integrity, but the normal sanction for a graduate student found responsible for a violation of academic integrity will be dismissal (suspension or expulsion) from the University.

## Intellectual Property Protection for Class Materials

All lecture materials are the intellectual property of the University of Maryland at College Park (and/or its instructors), and as such may not be video-taped, audio-taped, photographed, or otherwise reproduced for distribution without the explicit knowledge and written permission of

the Director of the Master's in Telecommunications Program and the permission of the course instructor. There are only two exceptions to this policy:

1. Material distributed by an instructor, such as copies of notes, copies of slides, solutions to homework or exams, or any other materials that *the instructor purposefully makes available to students* registered for his or her class.

2. Students who are deemed by the University of Maryland [Disability Support Services](#) (DSS) to require video, audio, or image media to support their learning process, *and is needed due to a legitimate disability.* In this case, a student may not record any part of any lecture without first contacting the DSS Office at 0106 Shoemaker Building (Phone: 301-314-7682). A letter from DSS authorizing the student's special accommodations must be delivered to the instructor, and finally, the *instructor must approve* the manner in which the student may be accommodated without disrupting the normal flow of his or her lectures.

In neither of the above cases may the course material be published (for example, in any form of on-line media, such as Facebook, Youtube, etc.), distributed, given, or lent to anyone not registered for the course.

Failure to abide by this policy will result in a case before the Office of Student Contact and will result in disciplinary action.

## Academic Probation and Dismissal

From the *[Graduate Catalog](#)*:

> A student whose cumulative grade point average falls below 3.0 will be placed on academic probation by the Graduate School. When a student is placed on probation, the Graduate School will notify both the student and the Graduate Director of the student's program. Permission of the academic advisor and the Graduate Director will be required for a student on probation to register for courses. Probation will be lifted when the student achieves a cumulative GPA of 3.0.
>
> A student on probation who has completed fewer than 15 credits must raise the GPA to 3.0 or above by the end of the semester in which the student completes 15 credit hours or be dismissed from the Graduate School. A student who has completed 16 or more hours of course work and whose cumulative GPA falls below 3.0 will be placed on probation and will have one semester in which to raise his or her GPA to a 3.0 or be dismissed from the Graduate School.

# Financial Information

## Tuition and Fees

The Master's in Telecommunications Program has a non-standard tuition.  Tuition for the 2015-2016 academic year is $1037.00 per credit.  The tuition rate is the same for all students, regardless of residency or citizenship.

The University also charges mandatory fees for all graduate students.  The fee schedule is set according to the number of credits registered.  For the 2015-2016 academic year, mandatory fees are $422.71 for 1-8 credits and $760.22 for 9-12 credits.  Please consult the Bursar's Office for more information.

## Graduate Assistantships

Since the Master's in Telecommunications Program does not normally offer financial support in the form of graduate assistantships, many of our students find assistantships in other units, especially non-academic units, which do not have graduate students.  Finding a graduate assistantship is, in many ways, equivalent to finding a job.  Therefore, students are strongly encouraged to seek the advice of the Engineering Co-op & Career Services office.  At a minimum, consult their Job Search Tips before you begin your GA search.  As a graduate student in the Master's in Telecommunications Program, your conduct and performance reflect upon the Program, so we advise the following:

- Comport yourself professionally
- Refrain from mass emails
- Exercise patience
- Exercise appropriate follow-up

There is no centralized posting of all available assistantships on campus, but many are posted on the University Human Resources' Employment Opportunities Web page.

From the *Graduate Catalog* section Policies for Graduate Assistantships:

### Categories

The official title of Graduate Assistant (GA) is used in all university documents, but, in general practice, Graduate Assistants are referred to either as Graduate Teaching Assistants (TAs), Graduate Research Assistants (RAs), or Graduate Administrative Assistants (AAs). Additionally, a small number of Graduate Assistants serve as resident life counselors. Qualified graduate students often move between these kinds of appointments during their graduate education.

### Administration

Graduate Assistants at the University of Maryland, College Park are under the direct supervision of the department, program, or unit that offers the appointment. The

department determines the GA's assignment, supervises his or her work, and recommends him or her for reappointment and promotion to various stipend or compensation levels. The department is the primary source of information for the details of the assistantship. Within the department, the GA's work assignment is determined by the Department Chair, the Director of Graduate Studies, any duly appointed executive committees and assistants to the chair, and/or the faculty member assigned to supervise the GA's particular course, laboratory session, or research project. Graduate Administrative Assistants are under the supervision of the heads of the academic or non-academic units in which they work.

…

**Qualifications**

A Graduate Assistant must be a registered graduate student in good standing enrolled in a degree program at the University of Maryland, College Park and must be making satisfactory progress toward the degree. Appointments are normally given to those students who have shown superior aptitude in their field of study and who appear likely to render a high quality of service to the university by their teaching or research activities or their administrative work in a unit. Advanced Special Students are not eligible to hold Graduate Assistantships.

…

**Compensation and Stipends**

Three categories (called Steps) are currently used for the classification of graduate assistantships. These steps, based on a student's experience and progress toward the degree, determine compensation levels. Graduate Assistants fall into one of the three steps:  Step I is only for first-year GAs; Step II is for second-year GAs, as well as for those students, new or continuing, holding a master's degree; and Step III is reserved for doctoral candidates.

The Graduate School sets the minimum stipend level for Step I. Departments and programs determine their own increments for Step II and Step III within guidelines set annually by the Graduate School. All GAs working within a particular step, in a particular unit, should be paid the same assistantship stipend.

TAs must be offered a 9.5-month or 12-month assistantship due to duties and responsibilities occurring after the last day of classes.

…

**Tuition Remission and Mandatory Fees**

Graduate Assistants on a full-time appointment (20 hours per week) are eligible for 10 credits of tuition remission in the Fall and Spring semesters and 4 credits in Winter Term. GAs on a half-time appointment (10 hours per week) are eligible for 5 credits of tuition remission in the Fall and Spring semesters and 2 credits in Winter Term. GAs on a full-time *12-month appointment* are also eligible for up to 8 credits of tuition remission during Summer; and GAs on a half-time *12-month appointment* are eligible for up to 4 credits during Summer.

Tuition remission is credited at the prevailing standard in-state credit hour rate at the time the class is taken. Some programs, such as the MBA [and Master's in Telecommunications], have higher credit hour rates or flat fee pricing. The tuition remission benefit does not cover the difference, which remains the responsibility of the GA.

*Tuition remission does not cover Mandatory Fees.* Please see the Bursar's Office for a current schedule of Mandatory Fees.

# Graduation

In order to graduate, students must follow the steps below and meet all deadlines that are announced by email, posted on the Forms and Deadlines section of the Web site, and/or set by the Graduate School.

1) Apply for graduation online through Testudo.
2) Complete the Scholarly Paper Topic Approval Form and Approved Program for the Master of Science Form and submit them both to the Program Office.
   a. On the second page of the Approved Program Form, list only those courses that have been approved to count toward your degree requirements. Any non-ENTS courses listed must have pre-existing approval paperwork in your file.
   b. The total number of credits must be 30.
3) Complete the Scholarly Paper Submission Form and Certification of Master's Without Thesis Form and submit them both to the Program Office, along with your completed scholarly paper. On the Certification of Master's Without Thesis form, write in "Scholarly Paper" under the section entitled "Seminar or Research Papers." The date of completion will be indicated by the Program Office once it has been reviewed and approved.

## Commencement

The University holds two commencement ceremonies each year—a spring ceremony in May, and a winter ceremony in December. Students should attend the ceremony that falls closest to their graduation date. Each commencement features a campus-wide ceremony and an individual college or school ceremony. As for the latter, Master's in Telecommunications students attend the A. James Clark School of Engineering ceremony.

**Campus-Wide Commencement Ceremony**
Tickets are required for the campus-wide ceremony. Please see the Commencement Website for more information.

**A James Clark School of Engineering Commencement Ceremony**
Tickets are NOT required for the individual school ceremony. This is also the ceremony where your name will be called, and you will process across a stage. Please see the Clark School Commencement Website for more information.

Commencement regalia must be purchased from the University Book Center. For all other information concerning tickets, parking, etc., please refer to the main Commencement Website.

**Alumni**
Graduates are encouraged to register and remain active with the Telecommunications Students and Alumni Network (TSAN).  The University of Maryland Alumni Association will also reach out to graduates with information relevant to alumni.

## Diploma

Diplomas will be mailed approximately 8-10 weeks after commencement. Diploma status can be checked online through Testudo at [Diploma Status](#). All inquiries should be directed to the Diploma Office at 301-314-8270 or diplom@umd.edu.

## Degree Verification

Master's degrees are posted to student records approximately two weeks after commencement. Students may then request an official transcript that verifies the degree has been conferred. Students needing additional verification of their degrees should contact the Program Office for assistance. The Program Office may only provide verification if all degree requirements have been fulfilled and no pending issues remain.

# Appendix 1: Scholarly Paper Guidelines

## Overview and Purpose

The Scholarly Paper's purpose is to demonstrate your ability to synthesize technical information in a coherent form. The document you write is intended to reflect the level of expertise and understanding that you have acquired after the first year in Graduate School; for further information on this, see the content section.

Telecommunications professionals, like most engineers and executives, will inevitably be called upon to compose technical or business document. The Scholarly Paper is intended to prepare you to write a "Working Paper" or trade publication. To this end, the paper should adhere to a style of proper academic writing and citations.

The paper should be an excellent addition to your job-hunting portfolio and it should accurately convey to an interviewer your understanding of telecommunications and professionalism.

## Format

The Scholarly Paper should include the following sections and parts:
- Title page with an appropriate and brief title, abstract, signed honor pledge
  - Abstract, a one paragraph (50-200 words) summary of the paper that states why the topic is important and what is being covered in the paper
- Introduction which presents the background for the subject of the paper
- Sections, one or more, that provide the main content of the paper
- Conclusion which briefly summarizes (one or two paragraphs) what the paper accomplished
- List of References in proper citation style.

The format of the Scholarly Paper should adhere to the following:
- Length: The body of the paper should be 5-10 pages in length, excluding the title page, list of references, and diagrams/images
- Font: Times New Roman, 12-point font
- Spacing: Double-spaced
- Margins: 1" (one inch) on each side

References and Citations:
- References must follow the IEEE Style Guide
- Include at least three distinct professional-grade references
- Internet links are not adequate citation formats. Internet addresses frequently change; an organization may change its domain once it's bought out, or it may simply change its archiving procedures or formats. Sometimes an organization will cease to make some of its publications openly available, requiring disbursement or membership to access those files. The reader should be able to locate the paper's source (journal, magazine, conference, etc.) and then decide to what lengths they will go to access a legitimate copy of that paper.

- The title and author are not enough for any search engine to find the paper. The reader may sometimes find a number of on-line copies of papers with that title and those authors (legitimate and otherwise), but may still not be able to discern what was the publishing source. Some papers have the publishing organization written in their margins, but not all do. Was it originally a white paper, or perhaps a brochure? Was it an article in a journal or a conference proceeding? Was the paper peer-reviewed before publication? The reader must be allowed to discern the credibility of the paper by verifying its legitimate source.

Additional Tips:
- Define any acronyms and/or technical jargon when they are first introduced in your paper

Scholarly Paper Topic Approval Form:
- Citations list in the Topic Approval Form must also follow the IEEE Style Guide
- Include at least three distinct professional-grade references
- Most common reason for topic rejection: Incorrectly formatted references!

## Format Downloads

Microsoft Word Scholarly Paper Template
Title Page Example

## Content

You may choose your own topic within the guidelines stated here. Your topic should relate either to the business or engineering aspects you have learned within the ENTS program. For example, a topic discusses in a course may provide a starting point from which a student may delve deeper. If you choose to do this, make sure that your choice is suitable for the Scholarly Paper and follows the spirit and depth of knowledge as described in the overview section. Note: Authors must verify that the Scholarly Paper does not overlap with any paper previously submitted for academic purposes.

You don't need to conduct original research. An investigation into the topic using a variety of credible sources should be enough. You should consult and cite a minimum of three distinct, professional-grade references.

## How Do I Get Started With Content?

Authors have a variety of methods for putting their ideas together. Here is one method:
1. Read the first paper that you are using as a source, the one you think is the most important for your topic.
2. Set the paper aside and think about what you've learned.
3. Make a bulleted list from memory of all the items you've learned that are interesting or important enough to be candidates for your paper.
4. Repeat steps 1 through 3 for all your sources you use as references, adding new bullets to your first list.
5. Now, group all the bullets by subject. At this point, you'll have some idea of how many sections your paper will have and a rough idea as to their titles.

6. Arrange the different groups of bullets in an order that you envision will give proper flow to your paper. Now you can write the section titles.
7. For each section, read over the bullets and replace each bullet item with paragraphs (possibly many paragraphs) that convey the meaning of your understanding of that bullet, allowing the ideas to flow with continuity.
8. Revise the entire paper, checking for flow and continuity *within* and *between* sections.

## Typical Setbacks Because of Content

A common problem is that students don't display *the expertise that they've achieved by now in either wireless communications or network theory* in their Scholarly Paper. The topic is often fine, but the student writes at a level which is too shallow, and a lay person could have written it. You've worked hard for a year; you should advertise all that you've learned. Remember that the reviewer is expecting to see the depth and level of expertise of a graduate student. Recall that the purpose of this paper is for you to convey that you've achieved the technical maturity to seriously delve into your paper's subject, formulate an opinion, and effectively communicate it.

If your reviewer says that the paper is too shallow, you should consider whether the problem may stem from the primary sources that you're citing. The clearest example is if most sources are Wikipedia articles, on-line product descriptions, or any other kind of sources with insufficient depth. You can find hints to avoid this common pitfall in the citations section, below.

Another possible cause for this problem is that you may spend a very large number of pages introducing very basic material, and then devote very little space to the actual topic which is supposed to be the main subject. Consider an example of such an error:

> Suppose a submission proposes a comparison between two technologies. Say that in this paper, out of its four sections, three are devoted to background material and only one is devoted to the actual comparison. In this example, much effort is placed on the introductory material, but then the section that carries the actual topic is only a single table or a referenced image with perhaps one or two paragraphs of text.

## Utilizing Tables, Images, or Lists

It is often useful to copy another paper's table, or an image which provides an easy summary of the subject you're discussing. (**Remember to properly cite these, when you do this,** as detailed in the format section.)

> A mistake is to delegate the entire explanation to a reproduced table, image, or a bullet list. The following example cites an image from a paper, then it shows what you shouldn't do, and then it says what you should do:

> For example, say you choose to cite "The LTE Link-Layer Design," by Anna Larmo, et al. (IEEE Communications Magazine, April 2009, Volume: 47 , Issue: 4 Page: 52- 59), and you choose to copy the image describing the User Plane Protocol Stack (Figure 2) into your Scholarly Paper (with proper citation).

You should not write, *"For LTE, the user plane protocol stack is described in the following figure,"*(even if you cite the source), and then leave it at that. Why? It is not acceptable because with no further contribution, you're not furnishing your own understanding of anything.

You should do one of two things: (1) Either copy the figure, add the proper citation, and add at least one paragraph with your own understanding of the figure, or (2) if you'd rather not include that explanation in your own words, then you might say, *"For information about the user plane protocol stack, readers are referred to Figure 2 of "The LTE Link-Layer Design," by Anna Larmo, et al. (IEEE Communications Magazine, April 2009, Volume: 47, Issue: 4 Page: 52- 59)."* In case (2), you cannot copy that image into your Scholarly Paper (because you're not talking about it).

In summary, you may reproduce tables or images *only* if you also include an active contribution of your own understanding in direct relation to the object you copied.

## Citations

A minimum of three, distinct, professional-quality references should be consulted. You have access to a large number of peer-reviewed articles and publications through the University of Maryland's Libraries' Research Port.

### Where Can I Find Good Sources?

One method to easily choose professional-quality articles is to make use of Google Scholar from any internet browser. You may enter the topic on which you wish to write papers, and Google Scholar will allow you to further narrow your search by selecting the range of dates on the left-hand side.

It's often a good idea to favor articles which have many citations to their credit (which is right below the search item, titled "Cited by"). A large number of citations means that many authors have found that article to be understandable and citation worthy. In the Google Scholar example below, you can see where red arrow shows the number of citations:



You may further narrow your search in Google Scholar by specifying the publication, such as, for example, the IEEE Communications Magazine.

Once you've chosen a few candidate articles, you may enter the citation details that Google Scholar yields (like author, title, journal, year, etc.) into the UM Libraries' Research Port to download the full article free of charge (popular databases, like IEEE Xplore Digital Library, usually charge a fee for downloading, however UM tuition provides students a free portal for thousands of databases). You will have to login as a student and provide your directory ID and password to take advantage of this library service.

## Hints for Sources

This section provides some hints on what type of publications might be helpful, and which ones may not be so helpful:

- Technical Magazines usually explore the development of new technologies, how current technologies are evolving within the consumer world, emerging standards, etc. They are often considered a very strong source where each article is passed through stringent review and editing processes. The subjects they cover usually are broad, and they do not often present proofs, extensive mathematical analysis, or long sequences of formulas. Examples include *IEEE Spectrum*, *IEEE Communications Magazine*, *IEEE Signal Processing Magazine*, and *IEEE Vehicular Technology Magazine*.
- Technical books and texts are considered very strong sources, since they are passed through a rigorous review and editing process.
- Trade magazines are sponsored by vendors, so you will often find biased opinions, but they also have sufficient technical content to rely on as a source. Examples include *RCR Wireless (sponsored by Powerwave Technologies)*, and *Wireless Week (Advantage Business Media owned)*
- Any conference proceedings are considered strong sources where each article is passed through a peer review process. Time-to-publish tends to be short, so subjects are usually cutting-edge. The subjects it covers may often be too narrow for the scope of the Scholarly Paper. Most articles do contain proofs, which are usually outside the scope of the Scholarly Paper. They will usually have mathematical analysis, and usually contain sequences of formulas, which are usually not in the nature of a typical Scholarly Paper. However, introduction and background sections of conference proceedings may be a good source. Examples include the *IEEE Vehicular Technology Conference (VTC) Proceedings* or the *IEEE Conference on Computer Communications (INFOCOM)* Proceedings.
- Any journal is considered a very strong source, where each article is passed through peer review processes. The subjects they cover may often be too narrow for the scope of the Scholarly Paper. Most articles do contain many proofs, which are usually outside the scope of the Scholarly Paper. They will usually have mathematical analysis, and usually contain sequences of formulas, which are usually not in the nature of a typical Scholarly Paper. However, again, introduction and background sections of journal papers may be a good source. Examples include *IEEE Transactions on Communications*, *IEEE Transactions on Information Theory*, or some variation of *Elsevier Letters*.

It is important to note that **these are very informal hints, and not guidelines**; that is to say, they should not be interpreted as rules or, in any way, do they reflect the expectations of the faculty

reviewers.

For example, you might find an article from *IEEE Communications Letters* that contains an extensive mathematical sequence that is immaterial for your Scholarly Paper, yet it may also contain very insightful Introduction and Background sections that you may find an excellent source for citing.

## Typical Setbacks Because of Citations

Common problems for cited sources are that the source may not be fixed, or the author is employing direct quotation, or all the cited works' content are too shallow (see the content section).

You should feel free to **additionally** include any number of sources that may, each by themselves, be deemed shallow; this is perfectly acceptable if you feel that some part of that source is valuable for clarity. However, the Scholarly Paper guidelines list that a minimum of three *professional-quality sources* are required.

The following sections detail selections that weaken a paper's choices of sources, like using a non-fixed source (Wikipedia), employing direct quotes, or basing a paper on very dated material.

## Do Not Use Wikipedia as a Reference

Wikipedia is not a fixed source because the content frequently changes and gets replaced. Many professionals refer to Wikipedia for casual consultations, but it cannot be used as a reference in a professional-grade work.

The reason for this is that your readers should be able to follow your sources to confirm what you've written or to pursue the subject in more detail on their own; therefore, the content of your sources should be *fixed*. Wikipedia's material, by design, evolves as different contributors change and (hopefully) improve the material. Therefore if you cite information from, say, paragraph 3 of the Wikipedia entry for LTE, there is no guarantee that this paragraph will have not been deleted the next day.

Wikipedia or any source where content is fluid and easily changed, without editing or peer review, is not deemed a professional-grade source.

There is a simple way to get around this problem: check what references Wikipedia is using and then read those sources and extract your information from there. For example, if you are reading a Wikipedia entry on LTE, and you find information that is pertinent to your paper, you can check Wiki's reference by clicking on the small reference number and then the link it provides. If it's not from an open database, then use your University of Maryland Libraries Research Port to find that article and read it, just as described in the citations section. You may then use that article as a reference.

# Avoid Direct Quotes

If you were writing about European Renaissance Drama, then it would be reasonable to include a direct quote, for example:

In his play, "The Merchant of Venice," dramatist William Shakespeare's main character, Portia, explains how mercy comes freely, and is most present in the mightiest:

> *"The quality of mercy is not strain'd;*
> *It droppeth as the gentle rain from heaven*
> *Upon the place beneath. It is twice blest:*
> *It blesseth him that gives and him that takes.*
> *'Tis mightiest in the mightiest; it becomes*
> *The throned monarch better than his crown; "*
> (*Merchant of Venice*, Act 4, Scene 1, lines 184-9)

But you're writing a paper dealing with science or technology, so direct quotes are not advisable. If you wish to convey the same idea as another author, then you should paraphrase and add a reference. See the academic integrity section for more information.

## Avoid Old Sources

Referencing old material is not specifically wrong, but if you're writing a professional grade paper about technology, you should stay away from sources that may be viewed as dated. Stick to sources no older than ten years unless there's a solid reason for citing that original work. This guideline doesn't apply to textbooks, which can be older.

## Academic Integrity

What is academic dishonesty, and how do we avoid it?

The simplest definition is pretty straight forward: Referencing or including another person's work (written text, pictures, diagrams, ideas, etc.) without proper citation constitutes academic dishonesty.

But the problem of *paraphrasing* versus *plagiarism* can be less clear: Representing the words or ideas of another person's as one's own, **even with citations** is academic dishonesty. This one needs a little more explanation and some examples, which is all provided in this section.

In all academic work including the Scholarly Paper, students must follow the University of Maryland's Code of Academic Integrity. For more information about academic integrity, please consult the Office of Student Conduct. The Scholarly Paper must consist of original work by the student.

## Confusion Between Paraphrasing and Plagiarism

For any University of Maryland student, plagiarism is defined as representing the words or ideas of another person's as one's own in any academic exercise.

It is strongly recommended that all students read the following examples, since the university employs a number of mechanisms to detect plagiarism and the normal sanction for a graduate student is dismissal (expulsion or suspension with grade "XF" in the course) from the University.

*It is important to note that you may inadvertently commit plagiarism, even though you've taken pains to include frequent citations.*

## What Plagiarism Looks Like

The examples below show attempts to paraphrase an excerpt from a paper. The first attempt shows word-for-word plagiarism, the second attempt shows patchwork plagiarism, and the third attempt shows acceptable paraphrasing. Note that there are many, many variations for plagiarism, however these serve as examples to convey the general idea.

### The Original Excerpt
Say Steve is writing a paper about location-based applications in wireless personal devices and he wishes to paraphrase this excerpt from the article "Mobile Crowdsensing: Current State and Future Challenges" by Raghu et al from the IEEE Communications Magazine (November, 2011, vol. 49, issue 11, pp. 32-39):

> "Various sensors such as GPS, accelerometer, microphone and camera are available on mobile devices. The operating system (OS) allows applications to access the sensors and extract raw sensing data from them. However, depending on the nature of the raw data and the needs of applications, the physical readings from sensors may not be suitable for the direct consumption of applications. Many times, some local analytics performing certain primitive processing of the raw data on the device are needed. They produce intermediate results, which are sent to the back-end for further processing and consumption. For example, in a pothole detection [5] application, a local analytic computes spikes from 3-axis acceleration sensor data to determine potential potholes."

### Word-for-Word Plagiarism
Word-for-word plagiarism of the original excerpt looks like this:

> Mobile devices include many sensors such as microphone, accelerometer, camera, and GPS [1]. The operating system (OS) permits the applications to access information from the sensors and thus obtain sensing data [1]. Depending on the characteristics of the data and each applications' needs, the sensor readings may not be in the proper format for each application to be able to use it [1]. Often, the device needs some local processing performing primitive analysis of the data [1]. This local processing produces midway results, which are transmitted to the back-end for more processing and, finally, consumption [1]. Consider the following example from [2], which describes an application that detects potholes. Here, a local processor detects spikes using data from a three-dimensional acceleration sensor, and determines possible potholes [1].
>
> [1] Raghu K. Ganti, Fan Ye, and Hui Lei, "Mobile Crowdsensing: Current State

and Future Challenges," *IEEE Communications Magazine*, vol. 49, issue 11, pp. 32-39, November 2011.

[2] P. Mohan, V. Padmanabhan, and R. Ramjee, "Nericell: RICH monitoring of Road and Traffic Conditions Using Mobile Smartphones," Proc. ACM SenSys, 2008, pp. 323�"36

This is plagiarism. Note that even though Steve took pains to include a citation after each sentence, it is still plagiarism. Steve largely copied the original work's ideas, and sentence structure (reordering the words in the sentences) and passed it as his own work.

Note that the citation tags do not prevent this from being plagiarism. Why? Because the audience is reading a (supposedly) independent work (by Steve), and therefore expects that, though Steve's foundations for making his claims are based on some other source of information, the substance he or she is reading comes from Steve, which in this case does not (it comes from the source).

### *Line-by-Line Word Reordering*
This manner of plagiarism is also called "patchwork paraphrasing" or "patchwork plagiarism." Using the original excerpt, it might look something like this:

Mobile devices include many sensors such as the following:
1. GPS
2. accelerometer
3. microphone
4. camera

The sensors send their data to the applications through the operating system. It should be noted that the sensor readings may not be in an adequate format for an application's direct usage, which depends on the characteristics of the sensor data and the needs of each application. It is expected that the device may require some local processing which will endeavor to perform data analysis of the information received from the sensors. The intermediate results are transmitted to the back-end for additional processing, and are then deemed ready to be used by the application. There are examples in literature where they describe applications such as pothole detectors. In such an example, a processor which is embedded into the device constructs local calculations which detect spikes by using data from accelerometers, and thus, detect lurking potholes. [1,2]

[1] Raghu K. Ganti, Fan Ye, and Hui Lei, "Mobile Crowdsensing: Current State and Future Challenges," *IEEE Communications Magazine*, vol. 49, issue 11, pp. 32-39, November 2011.

[2] P. Mohan, V. Padmanabhan, and R. Ramjee, "Nericell: RICH monitoring of Road and Traffic Conditions Using Mobile Smartphones," Proc. ACM SenSys, 2008, pp. 323�"36

This is plagiarism because this section extracts pieces of the original work and simply merges them with Steve's own words. The fact that the words are re-ordered, or replaced by synonyms does not detract from the fact that Steve is presenting these ideas as his own, when, in fact, they have been lifted from the source. Steve's contribution is not (as it should be) Steve's own understanding of this concept reworded into his own language and adapted to the context of Steve's paper. Instead, this example shows that Steve's contribution is to utilize a thesaurus and manipulate grammar with sufficient dexterity to say exactly what the source says, but make it look different.

*Correct Paraphrasing or Summary*
A correct example of how to paraphrase or summarize the original excerpt could be:

> Location and direction of movement information, such as that provided by a GPS receiver, accelerometers, and gyroscopes, among other sensors are commonly available on mobile devices. This data can be exploited by mobile applications, though sometimes the raw data collected from these sensors may require some local processing to transform it into a form that is expedient for each application [1].

> [1] Raghu K. Ganti, Fan Ye, and Hui Lei, "Mobile Crowdsensing: Current State and Future Challenges," *IEEE Communications Magazine*, vol. 49, issue 11, pp. 32-39, November 2011.

It is important to note that Steve's paraphrasing is *in no way an identical reflection of the original source's paragraph*. On the contrary, Steve here chooses to reflect his understanding of the original source, in Steve's own words, and molded to the context of his own paper.

Since this business of paraphrasing can be delicate, here are more examples that compare proper paraphrasing to patchwork paraphrasing and direct plagiarism.

University of Wisconsin at Madison Writing Center
Purdue University
Purdue University (2)


# Writing & English
There are many resources here to help you make sure that your paper is written in proper English that is grammatically correct and syntactically sound. It's an excellent idea to have other people proofread and edit a few drafts before going over it yourself and finally submitting it.

The following sections provide advice, list resources at your disposal, and describe common pitfalls.

## Quick and Easy Error Detection
Many text editors have integrated spelling error detection and even grammatical error detection. The proficiency of these error detectors varies widely from product to product. One editor that

has an adequate error detector *for first drafts* is Microsoft Word, which is available to the University of Maryland students.

By simply copying and pasting the first draft of your work into Microsoft Word, the spelling errors should appear underlined in red, like this:

## Communciations

A grammatical error may not always be detected, and sometimes the mechanism does not underline all the problematic words, but it will probably underline the most likely sources of the problem in green, like this:

## The fastest among all the rates is many desire.

Note that this will be very much a **first draft** of corrections for the paper's spelling and grammar. To prepare the Scholarly Paper for submission, you are *strongly* advised to take full advantage of the many resources at your disposal.

## Typical Setbacks Because of Language, Form, or Grammar

Make sure that your Scholarly Paper does not display poor writing skills and/or typographical errors. The reader (reviewer) should be able to understand the meaning of every sentence in the Scholarly Paper.

The paper should be in the form of a professional-grade work (hint: don't use bulleted lists to convey understanding; bulleted lists may convey information, but not understanding... this is detailed below).

## Subject and Predicate: Create a Sentence

Every sentence must have a verb (action word) and a subject (the object the sentence is about). Sentence fragments do not convey your meaning to the reader.

The University of Wisconsin at Madison's Writing Center has a good web page that explains this with examples, here.

What do we mean with "fragments"? Fragment constructs are often seen in the context of novels, such as the following example:

> The class became boring. Very boring.

Here, the author uses this construct for humor. In this snippet, the author almost assumes a first-person narrative, so the reader imagines that the writer was very bored in a class. A fragment without a verb, such as "Very boring," as seen in this example, is not suitable for professional-grade or technical papers.

Papers should not have sentences lacking a full-construct of subject and predicate. All students are strongly advised to take advantage of the many writing assistance resources available to them and listed in the writing resources.

## Avoid Bulleted Lists

Bulleted lists are a useful tool to allow readers to extract information quickly. The problem is that *the purpose of the required Scholarly Paper is not to convey data.* If a reader wants data, he or she should retrieve it from the original sources which are cited in your Scholarly Paper. The purpose of the Scholarly Paper, by contrast, is to convey *understanding*.

There are times when you may wish to expand on your observations, speculations, or analysis related to a piece of data; in such cases, it is suitable to either copy a table from the source, or create a **short** bulleted list with the data (suitably cited in both cases), for quick reference. However, you should use the table or bulleted list as a *supporting element* to your own sentences, remarks, or analysis about it.

A Scholarly Paper must never have entire sections comprised solely of long bulleted lists.

Bulleted lists can be a very useful tool for when you're beginning to put your ideas together for the paper; a bulleted list is a good start for an outline of your Scholarly Paper. Here is an example of how this could work:

> You can begin by listing all the ideas and points you want to make in your paper in bullets. Next, group the bullets by subject (so the paper is properly organized).
>
> After you've grouped your bullets by subject, you may consider creating a section for each group of bullets and thinking up a proper section title for each group.
>
> Finally, replace the bulleted items with paragraphs and sentences. Give the paper fluidity, so the reader doesn't find him or herself jumping from one subject to another, without connections.

## Writing Resources

The University of Maryland's Graduate School has put together a number of writing resources from a variety of sources that provide helpful guidance in English, grammar, composition, and citations like the following:

[The Graduate School Writing Center](#)

[English Editing for International Graduate Students](#)

[The Graduate School Grammar and Style Guide](#)

[IEEE Style Manual](#)

[Purdue University's Online Writing Lab](#)

## For Advanced Polishing

The Scholarly Paper is both an excellent opportunity for you to hone your skills for communicating in the professional world, and a good addition to your job-hunting portfolio. The more it is technically sound and the more it is an effective communication tool... the better it

reflects on you.

Authors who want to go the extra mile in terms of polishing their written English may want to read the book "The Elements of Style" by Strunk and White; you can find it in the UM libraries (UMCP McKeldin Library Stacks; PE1408 .S772 2000).