

# Degree Schedule – Graduate Certificate in Frontiers in Materials Physics

Due one semester prior to completing certificate requirements. Complete form, obtain signatures, and then upload to [Canvas](https://mtu.instructure.com/courses/286200/modules) (preferred) or email to [gradschool@mtu.edu](mailto:gradschool@mtu.edu). Your [Degree Completion Timeline](https://mymichigantech.mtu.edu/web/home-community/current-students?p_p_id=GradDegreeStatus_WAR_EAS_Grad_Degree_Statusportlet&p_p_state=maximized&launch=Y) lists all items needed for your degree.

The graduate certificate in “Frontiers in Materials Physics” aims at developing the foundational knowledge and techniques in the areas of lowdimensional materials, quantum and topological materials energy materials, atmospheric particles and nanomaterials. Students may also explore applications for spectroscopy, photovoltaics, optoelectronic devices, and environmental optics. Students earning this certificate will be able to explain the key concepts of frontier materials including one or more of the following topics: quantum confinement effects, crystal structures, energy band structures, electrical and/or optical properties. Students earning this certificate will be able to explain one or more of the following topics: materials synthesis, materials characterization, device fabrication, applications of materials. A minimum of nine total credits is required for this certificate. Only three credits may be at the 4000 level.

## Contact person

Please complete the table below to identify the person to be contacted for questions about this curriculum.

|  |  |
| --- | --- |
| Description | Program Information |
| Name: | Yoke Khin Yap |
| Phone number: | 7-2900 |
| Email: | ykyap@mtu.edu |

## Changes for the upcoming catalog year

Please select the option that best reflects this curriculum.

|  |  |
| --- | --- |
| Description | Select one |
| There are no changes to this curriculum for the upcoming catalog year. | X |
| There are curriculum changes for the upcoming catalog year. (Please indicate those changes using tracked changes to indicate additions, changes, and deletions) |  |

## Student Information

Complete the information requested below.

Name Last or Family Name, First Name or FNU

M-Number (M12345678) M

Your name will be printed on your certificate as it appears in our University records with either your legal or preferred name. Please choose how you would like your name to appear on your certificate and type it in full. Students may contact the Registrar’s Office to change their preferred name; employees may contact Human Resources.

Selection for name Choose an item.

Typed name Name as it should appear on diploma

## Accelerated Certificates

Certificate programs may allow up to three (3) credits earned while an undergraduate at Michigan Tech to be used to fulfill the requirements of their bachelor’s degree and graduate certificate. To earn an accelerated certificate, students must:

* [apply for admission](https://www.mtu.edu/gradschool/prospective/apply-now/) to the certificate program following current procedures,
* follow all current policies regarding the reuse of credits, and
* mark the accelerated class(es) with “AC” in the “Semester and Year Taken” column in the tables below.

## Required Coursework (2 or 3 Credits)-Choose one of the following

In the table below, mark the classes taken for the certificate with the semester the credits were earned.

| Semester and Year Taken | Course Number | Course Title | Number of Credits |
| --- | --- | --- | --- |
| Semester | PH 4510 | Introduction to Solid State Physics | 3 |
| Semester | PH 5530 | Selected Topics in Nanoscale Science and Technology | 2 |
| Semester | PH 5520 | Materials Physics | 3 |

## Elective Coursework (5 Credits)

In the table below, mark the classes taken for the certificate with the semester the credits were earned.

**Note**: Only three credits at the 4000 level may count toward the certificate requirements.

| Semester and Year Taken | Course Number | Course Title | Number of Credits |
| --- | --- | --- | --- |
| Semester | PH 5510 | Theory of Solids | 3 |
| Semester | PH 5520 | Materials Physics | 3 |
|  | PH 4510 | Introduction to Solid State Physics | 3 |
|  | PH 5530 | Selected Topics in Nanoscale Science and Technology | 2 |
| Semester | PH 5151 / MSE 5151 | Quantum Field Theory for Photonics and Materials | 3 |
| Semester | EE 5430 | Electronic Materials | 3 |
| Semester | EE 5490 | Solar Photovoltaic Science and Engineering | 3 |
| Semester | EE 5471 | Microfabrication Laboratory | 2 |
| Semester | EE 5460 | Solid-State Devices | 3 |
| Semester | MSE 5130 | Crystallography & Diffraction | 3 |
| Semester | MSE 5550 | Transmission Electron Microscopy | 3 |
| Semester | MSE 5580 | Introduction to Scanning Probe Microscopy | 2 |
| Semester | PH 4292 / MSE 4292 | Light and Photonic Materials | 3 |
| Semester | MSE 4530 | Scanning Electron Microscopy and X-ray Microanalysis | 3 |

## Coursework Substitutions

Fully complete the table with the information requested. Include any courses for the certificate that are not named in the above tables. Approval of courses not listed above is at the discretion of the program granting the certificate.

| Semester and Year Taken | Course Number  ex: CH5555 | Course Title  Include the course number (as listed above) of the substitution and a brief rationale.  The table will expand to fit your text. | Number of Credits |
| --- | --- | --- | --- |
| Semester | Course Number | Course number of substitution, and rationale | Credits |
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| Semester | Course Number | Course number of substitution, and rationale | Credits |
| Semester | Course Number | Course number of substitution, and rationale | Credits |

Graduate School Use Only: Total Credits

## Approval Signatures

Obtain signatures from the certificate program, then upload signed form to [Canvas](https://mtu.instructure.com/courses/286200/modules) (preferred) or email to [gradschool@mtu.edu](mailto:gradschool@mtu.edu). The Graduate School approves the form after receipt and verification.

Department chair, Physics OR [Graduate Program Director](https://www.mtu.edu/gradschool/prospective/directors/), Frontiers in Materials Physics Date

Graduate School Approval Date