

SPUM 102 The tools of physical tool

Lecturer: Yichen Liu (contact: yichen.liu@connect.um.edu.mo, profile: [cheysen.fit](#))

Time: 19:00 - 21:00, Every Saturday (may change for the makeup classes)

Venue: E6-G111c (may change according to the classroom arrangement, please refer to the WeChat group messages)

1 Goal

The seminar of Physics - UM (SPUM) is an experimental lecture offered for participants who really have a passion for physics studies. We are willing to provide the Physics and Mathematics basis covering the contents that the University of Macau's curriculum doesn't offer, supplementing the potential theoretical shortcomings of our DPC students. The lecturers are all students, and you are welcome to share your self-learning harvests with us in the coming semesters.

We want to know the quality of our lectures, how much could our participants learn from our lectures, and the hardness of the concepts. Your feedback is really important for us to provide high-quality educational resources.

2 Reference textbooks

1. 吴崇试, 高春媛. (2019). 数学物理方法(第三版). 北京大学出版社.
2. K. F. Riley, M. P. Hobson, S. J. Bence. (2006). *Mathematical Methods for Physics and Engineering* (3rd version). Cambridge University Press.

3 Knowledge points

Starting from **complex variables**, you will be introduced to some useful tools to solve physical problems, such as **Γ function, Laplace transform, δ function, Green function, and some computer skills**.

You will have chances to learn the **power series method** and use it to solve **differential equations** in *APAC4004 Mathematical Methods in Physics*. So, over here I will just give a brief introduction to them.

4 Outline (may change according to the time arrangement)

Lecture	Content
1	Complex number, Analytic function, Complex integral
1.5	Computer skills: <i>L^AT_EX</i> , Markdown, MATLAB, Python, etc.
2	Infinite series, Taylor series and Laurent series, Singularity
3	Residue theorem and applications
4	Γ function
5	Laplace transform and applications
6	Integral transforms
7	δ function
8	Green function