

# TEACHING PORTFOLIO

**Professor Sushil Kumar**  
**School of Engineering and Physics**  
*Faculty of Science, Technology and Environment*

Education is the most powerful weapon which you can use TO CHANGE THE WORLD- Nelson Mandela

## Background

I have more than 20 years of teaching experience which includes more than 15 years of teaching at USP, where I had the opportunity to deal with a variety of learners from diverse cultural backgrounds. I brought a range of teaching and research competencies with me to USP acquired from teaching experience at two tertiary institutes and research collaborations with reputed research institutions (e.g. Indian Institute of Geomagnetism, Physical Research Laboratory, India), and participating in the 18<sup>th</sup> Indian Scientific Expedition to Antarctica, December 1998-April 1999, and conducting a scientific research experiment at the Indian Antarctic station, Maitri. However, it is at USP where I have really developed my teaching, research and administrative skills. My teaching responsibilities at USP have been at UG and PG levels: 100 level (PH101, 102, 105, 106), 200 level (PH203, 205, 206), 300 level (PH302, 306) and 400 level (PH402, 421, 422), and the course SC400 at the faculty level. I believe that the effective teaching comes from strong commitment and integrity of the teacher and how well and clearly the subject knowledge is delivered apart from teacher's preparation and organization, and the students' interest is stimulated and maintained. My teaching philosophy is student-oriented with the main motto, "no student is left behind" and that students remain interested, focused and motivated for which I use various strategies as highlighted in this portfolio.

## 1. Approaches to teaching that influence, motivate and inspire students to learn to develop their full potential

There seems to be a general feeling among students that Physics is a difficult subject with limited scope, and that the career pathways are not apparent. To remove this misconception, my first aim is to make students realize the broader applications of Physics in every walk of life and that Physics is a fundamental science underpinning all of the modern Science and Technology (e.g., Medical Science, and Information, Communication and Technology). Physics graduates possess a strong combination of quantitative, analytical and problem-solving skills required across a range of applications.

To influence, motivate and inspire the students, and help them to explore their full potential, my approaches are to;

- motivate students to learn about the subject by arousing their curiosity and interest through the real-life learnings (e.g. PH302, Antennas).
- change the perception of the students that physics courses are demanding and uninteresting with limited applications.
- create a positive learning environment which respects and nurtures intellectual and problem-solving skills and promotes their own learning through active participation, dialogue with and among students.
- help enhance critical thinking and problem-solving skills and be a creative and innovative thinker.
- use illustrative examples and highlight their relevance and applications to the society ( e.g. PH302: Satellite and Fibre Optic Communication, PH206: Lightning Protector).
- provide timely feedback on students' performance and provide extra support to at-risk students.
- involve presentations followed by conceptual questions, immediate feedback and promote discussion.
- organize small group discussion in the tutorial about the conceptual question followed by an individual or a group response.
- pose conceptual questions in a way to engage students in the lesson such that questions allow students to develop their critical thinking.

In any class, there are students who are motivated while others are not. I try students to realize that strong motivation leads to success, while a lack of it results in a poor performance, by giving the examples of some of our old students and some of the excellent researchers who have achieved excellence in research and also by telling students about the research findings on strong relationship between the academic motivation and the level of performance [e.g., *Fortier et al.,1995*].

I have found that an old age question, which I received from my teachers, and that I pose to the students before starting a new topic, “*why are we learning this topic*” and then give some time to the students to think and express about any practical and scientific application of that topic to further generate students' interest and enthusiasm.

*Sample Comments of Student Nominees:*

- His knowledge in his field has been an inspiration to me. His explanation of concepts and his humble and professional character should also be counted especially when he is one of the persons in the hierarchies of the university”.
- Prof Kumar was very motivational when I was an undergraduate student and influenced me to undertake Masters Studies. Prof Kumar is very approachable and makes difficult Physics concepts easy to understand by breaking in down into manageable chunks.
- Inspired me a lot by his knowledge based on research work and discussing it with us, and helped me learning my course by explaining things on board, responding to every email.
- He motivates us to work and do well in our studies. He has inspired us through his research works and the places he has been around the world.

To further develop students' potential through critical thinking, analytical and problem-solving skills, I concentrate on the *problem/applications* and *research-based* teaching approaches.

### a) Problem-based Learning and Teaching

In today's changing world, our students need to be creative and innovative thinkers and capable of providing solutions to the problems. The concept of problem-based learning (PBL) evolved from health sciences and a good amount of literature is available on PBL [e.g. *Savery, 2006; Tick, 2007, Drăghicescu et al., 2014*]. In general, PBL based teaching and learning strategy is considered as a central component of Science (e.g., Chemistry, Physics, and Biology) and Technology teaching. In PBL, the learning starts with the problem about which students first acquire the knowledge and information required to solve the problem. "The PBL empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem" [*Sarvey, 2006*]. I consider that the application of PBL based learning changes the students' attitude towards learning Physics and increases their interest and motivation. ***As an example***, for one of the courses (PH206), I used to give under applications of PBL in electrostatics a problem – "lightning (thunderstorms) threatens to the building" that can be solved by using *Lightning Protectors* and used to explain it when the topic related with this particular problem/application was covered. ***Another example***, taken from PH302 teaching (week 8) is "*Design three element Yagi Antenna for the reception for a TV station working at 196 MHz*".

The PBL model I use deals with "real world" problems where as a teacher, I facilitate the development of critical thinking and problem-solving abilities of the students. The students utilize different skills to solve the problems: *Embark and Clarify* - to understand the problem (USP's RSD model), *identify and absorb knowledge* to solve the problem, *collect/generate* information from various sources, *synthesize* the obtained information in order to generate possible solutions, *find best/most adequate* solution and then present and disseminate the solution. My goal is to help students explore solutions to the problems. The Research Skills Development (RSD) framework (<https://www.adelaide.edu.au/rsd/framework/rsd-framework.pdf>) was devised by John Willison and Kerry O'Regan during 2006 at the University of Adelaide (<https://www.adelaide.edu.au/rsd/>). It is a conceptual framework for the explicit, coherent, incremental and spiralling development of students' research skills [*Willison and O'Regan, 2006*]. Under the Strategic Total Academic Review (STAR) process at the University of the South Pacific, it was recommended that RSD framework is a suitable model to be adapted and implemented at USP following which with the help of Dr John Willison a RSD framework for the USP was prepared, details of which can be seen on USP Research URL [https://research.usp.ac.fj/?page\\_id=135](https://research.usp.ac.fj/?page_id=135).

### b) Research-Based Learning and Teaching

At a research-intensive university such as now USP, research and teaching are required to be interlinked. I bring the research-based learning mainly to my PG courses and to some good extent to the UG courses also. ***For example***, my PG course PH402 involves a high degree of research component in terms of applications of the radio waves for a variety of communications such as sky and space wave communications and the effect of extreme terrestrial and space weather conditions on a wide range of communications and upper atmosphere. They also learn how to use radio wave techniques to identify the signatures of natural hazards in the upper atmosphere. Their projects are entirely research-based. At the undergraduate level, ***for example in PH302***, I include research component in the field trips and the lab projects. One of the most effective ways I have found to

motivate students is through experiential and field trips learnings. *For example*, PH302 field trip has two components: a) local field trip where students are explained how different kind of antennas are used for research and how the amplitude and phase of the electromagnetic waves are recorded practically, b) external field trip in which we take students to FINTEL and Nausori Airport Communications Systems where students learn how different communication systems taught in this course are used such Fiber Optics at FINTEL and HF antenna and radio transmitters to communicate with airplanes. The students through fieldwork (e.g. PH302) realize and discover a whole new aspect of learning where they learn how the knowledge is applied to practical situations. Some pictures of the PH302 field trip are shown here.



A snapshot of local field trip: showing VLF magnetic loop and GNSS antennas used to record the data: Pictures taken from a section of field trip report of a PH302 student. April 2018.



A snapshot of students enjoying PH302 Field trip: a) in front of FINTEL and b) at the airplane tracking and distance finding facility at Nausori Airport. April 2018.

*Sample Comments of Students: Field Trip Report (ref, PH302 moodle page).*

*A Sample student comments on a field trip:* Upon completion of this field trip, it was learned how the communication is done using the network. This is studied as a transmission line, waveguide, modulations and antenna which are used in University of the South Pacific Laucala (USP), Fiji International Telecommunications Limited (FINTEL) and Nausori Airport. This field trip gave us the fair knowledge on what we did in PH302 lecture and labs. April 2018.

## **Criterion 2: Development of curricula and resources that reflect a command of the field**

Since I joined USP more than 15 years ago, I have contributed to the development of various courses in terms of developing new courses, revising the course contents, developing print and online materials, developing/revising the lab manuals, handouts that have significantly improved the delivery of several courses both at UG and PG levels. Through the international collaborations and internal and external research grants, I have arranged research equipment which has been installed in Fiji and at three USP regional countries campuses. Using this equipment (Fiji) several students have obtained their Masters (07) and PhD (01) degrees, and 5 students are currently pursuing their higher research degrees.

### **a) Developing/Revising Courses**

- PH302: Under the Physics Programme Review, this course was revised to include the contents that can serve engineering students also. 2017
- PH306: Under the Physics Programme Review, this course was revised to add 6 weeks of new content to serve our stakeholders. 2017
- PH402: Revised to include the section on the applications of Radio Wave Propagation particularly relevant to natural hazards to which South Pacific region is highly vulnerable.
- SC356: Developed the first draft of this as a new course which was then revised by the faculty to the present form.
- I have contributed to the development of teaching material/resources (handouts, tutorial, power points, quizzes, topic activities etc) for the courses: PH101 (in part), PH102 (in part), PH206 (most), PH302 (total), PH402 (total), SC356 (in part), SC400 (in part) and EV405 (in part). The print mode material was developed for courses PH101 (in part) and PH102 (in part) and most of the online material for the courses PH206 and PH302. *Please see the sample class handout. (File, Sample Handouts).*

The aim of revision of the courses/programme and the course material is to better serve our stakeholders by preparing our students for what is currently in the field. *For example*, a section on Geophysics and Seismology was added in the course PH306: *Special Topics* after discussion with *Seismology Section of Mineral Resource Department*, Fiji, who is one of the stakeholders of Physics and Maths students.

## b) Developing/Revising Laboratory Manuals

In sciences, laboratory manuals well aligned with the course contents having clear methodology and analysis of data play a significant role in the students' learning. I have contributed to the development and revision of the following laboratory manuals for Physics courses:

- Developed a new laboratory manual with one of my colleague for a new course PH106 in the year 2006. Team: Mrs Umavati Prasad and Dr Sushil Kumar. [Annexure I](#).
- Revised laboratory manual of the course PH205 by introducing a couple of new experiments and by correcting the input parameters and circuits. Please note that all the circuits and figures for the revised manual were drawn by me. Dr. Sushil Kumar. [Annexure II](#) (a couple of introductory pages of manual).
- Revised laboratory manual of the course PH101 in a team. Mrs. Umawatti Prasad, Dr. Sushil Kumar, Mr. Anil Deo, Mr. Abhikesh Kumar, Mr. Naveendra Reddy. [Annexure III](#).
- Revised laboratory manual for the course PH203 along with one of my colleague. Team: Dr V. Ramachandran and Dr Sushil Kumar. [Annexure IV](#).
- Developed laboratory manual for the course PH206 in a team (Dr Sushil Kumar and Mr Abhikesh Kumar) which is an amalgamation of the experiments from PH203 and PH205. [Annexure V](#).
- Currently, working on the revision of the laboratory manual for the course PH302 with the intention to have it ready for the semester I, 2019 students.

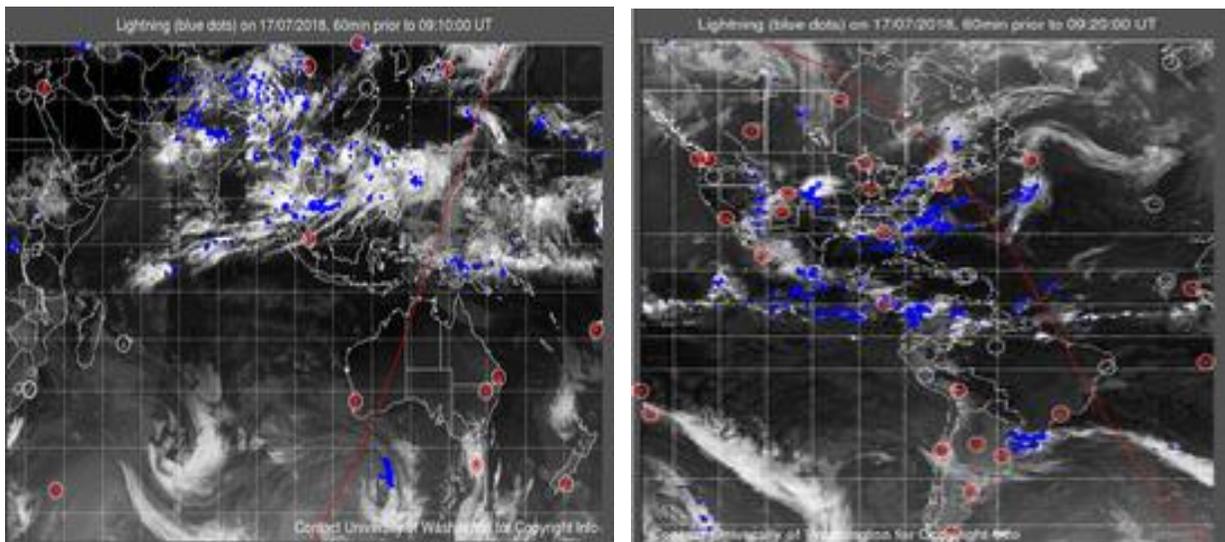
During the first week of lab sessions, I give students clear guidelines on how to write the lab reports, and I teach them how to write good discussion and conclusion sections of the reports which are most challenging parts of the lab reports. The impact of the revised lab manuals and clear guidelines is seen by students completing their experiments in time of a given lab session and better learning with hands-on experiments. There are least/no negative comments about the laboratory part of courses with revised lab manuals that can be seen from SEC reports.

### *Sample Comments of Students:*

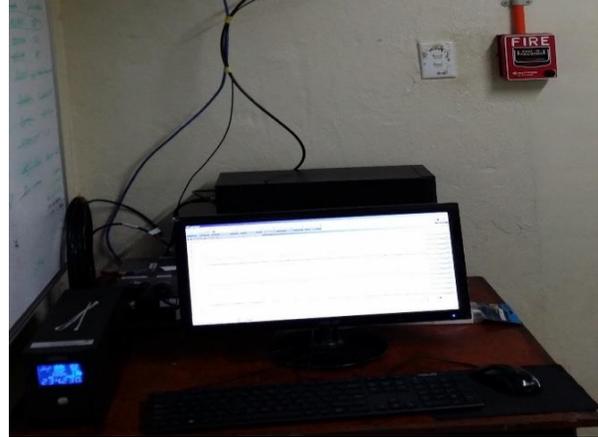
- The resources he uses is his own notes; he takes it out from his research; hence it helps us, students, to improve our understanding of the concepts we learned in the previous years.
- Lectures, online resources, field trips to relevant industries showing opportunities where physics knowledge in Fiji can be applied, and his own established studies to demonstrate how we can further discover many great things that physics can offer through our studies and research.
- Has introduced new experimental techniques within my physics courses. Has taught me from 200 level course 300 level course and now 400level. One of the best staff who introduces many new interesting concepts.

### c) Research Facilities Development

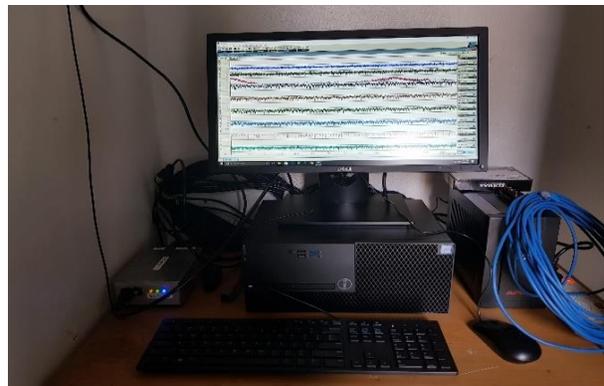
It has long been accepted that research makes a significant contribution to the improvement of the quality of teaching [Brew and Boud, 1995; Badley, 2002; Brew, 2003]. I have initiated research in the areas of Extremely Low Frequency (ELF) and Very Low Frequency (VLF) under a research grant from USP in collaboration with Worldwide Lightning Location Network (WLLN), University of Washington, USA and Otago University, Dunedin, New Zealand. There are about 50 universities/institutes including those from Australia and New Zealand currently participating in this network. Equipment was provided by WLLN Center, Otago, New Zealand, at no cost to us. Further details can be seen on the web: <http://webflash.ess.washington.edu>. There is a PH302 experiment on “*Ionosphere and Weather*” in which students do study the variation in lightning occurrence during normal and disturbed weather conditions in the South Pacific Region using the real-time lightnings detected by this network. Students find very interesting to see the enhanced lighting activity during severe weather conditions particularly during the tropical cyclones of different categories in the region and globally. They also realize how VLF radio wave technique could be used to detect lightnings and predict severe weather conditions. A snapshot of lightning occurrence at 00:02:00 UT on 17 July 2018 in the Pacific and the American regions is shown below:



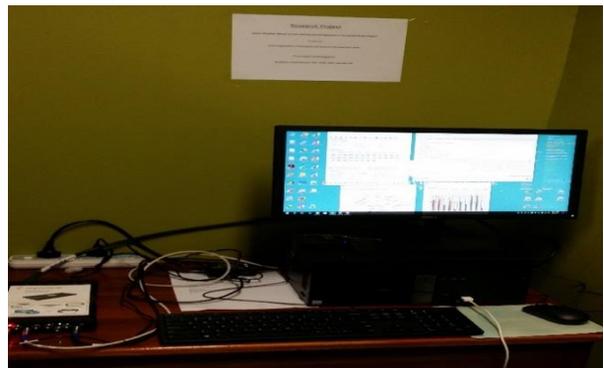
Recently, research facilities in the ELF-VLF area have been established at Alafua Campus, Samoa, and at Emalus Campus, Vanuatu, under the SRT projects: 1) *Natural Hazards detection, analysis and socio-economic impacts in the South Pacific Region - Fiji and Samoa*, 2) *Investigations of Sea State and Upper Atmosphere during Earthquakes and Tropical Cyclones in the South Pacific Region: Fiji, Vanuatu and Samoa*. Please see pictures of experimental setup at Alafua Campus, Samoa and Emalus Campus, Vanuatu.



ELF-VLF experimental Set-up at Alafua Campus, Samoa, under SRT project (1): 2016



ELF-VLF experimental Set-up at Emalus Campus, Vanuatu, under SRT project (2): 2018



GNSS experimental set-up at Tarawa Campus, Tarawa, under external funding, 2017

Last year in September, a research facility at Tarawa Campus, Kiribati, was established under research project “Space Weather effects on Ionospheric electron content and L band scintillation at Equatorial and Low latitudes” funded by Asian Office Aerospace Research and Development, Tokyo Japan. Please see pictures attached (above figure, lowest panel).

The research facilities under a MoU with Institute of Ionosphere and Magnetosphere (IIM), School of Electronic Information (SEI), Wuhan University, Wuhan, China, have been established at Lau-cala Campus in the area of ionospheric studies using a system called “Ionospheric Scintillation and TEC Monitor” provided by IIM. No picture appended.

The relevant results from these facilities at times are integrated into teaching when such topics are covered, particularly at 300 and 400 level apart from Masters and PhD research projects.

*Sample Comments of Student Nominees:*

- He is the best researcher and his ideas inspired me to take up the Masters programme by research in his area of study.
- The resources he uses is his own notes, he takes it out from his research; hence it helps us, students, to improve our understanding of the concepts we learned in the previous years.
- The different research techniques and ideas in space physics.

### **3. Approaches to assessment and feedback that foster independent learning**

Assessment is an integral part of the student learning, and I believe in learning-oriented assessment in which assessment is focused on using assessment strategies to enhance students learning. Careful alignment of assessment with the learning outcomes is critical to make sure that students learn what they are supposed to learn from a course. I design the assessments based on material I have covered in the course, teaching/learning activities carried out and are well-aligned with the student learning outcomes. My assessments are at a level appropriate to the course (100, 200, 300, PG), useful, and target a level of performance. My assessment tasks are aligned with **Bloom’s Taxonomy** adopted by the USP, in which students are supposed to start with the lowest level to the highest level of skills: *knowledge, comprehension, application, analysis, synthesis, and evaluation*. The amount of assessment given to the students is appropriate keeping in mind the total workload of the students in the course so that they are neither under nor over assessed. **For example**, SEC score (<https://mis.usp.ac.fj/csrs/Login.aspx>) on the question “*The assessment tasks and workload were appropriate for the course and learning outcomes*” for PH302 was 92.86% (2018), 85.71% (2017), 88.89% (2016). The assessment requirements are stated in the course outlines that are made available to students through the course Moodle shell and are explained in the first introductory lecture and at the time when assessment is released to the students. The purpose of each component of the total assessment and its alignment with the respective learning outcome is explained to the student, **an example** of which is given in Table 1 and Table 2.

**Table 1. ALIGNMENT OF LEARNING OUTCOMES, ACTIVITIES AND ASSESSMENT**

Course Learning Outcome	Associated Activities	Assessment Technique	Graduate Outcomes	IPENZ Graduate Attributes
1. Evaluate wave propagation in unbounded and bounded media.	Lectures, Tutorials, Labs	Assignments (Tut type problems), Tests, Lab reports, Final exam	Physics Knowledge (C), Critical Thinking (M)	WA3 (C), WA4 (C)
2. Analyze the performance of antennas and modulation methods.	Lectures, Tutorials, Labs, Projects.	Problems, Tests, Lab reports, Final exam	Critical Thinking (M), Physics Knowledge (C)	WA2 (C), WA2 (C)
3. Design communication systems for practical situations.	Lectures, Tutorials, Projects	Problems, Tests, Project reports, Final exam	Critical Thinking (M), Physics Knowledge (C), Formulate Solutions (C)	WA3 (C)
4. Solve electronics communication problems in teams.	Lectures, Tutorials, Labs, Project, Project Presentation	Lab reports, Project reports, Presentation	Ethics (C), Communication (C), Teamwork (M), Physics Knowledge (C), Formulate Solutions (C), Critical Thinking (M)	WA9 (C), WA10 (C)

**Table 2. ASSESSMENT PORTFOLIO**

Continuous Assessment: **50%**, Final Examination: **50%**

TYPE OF ASSESSMENT	WEIGHT	COMMENTS	LEARNING OUTCOME
<b>14.1 CONTINUOUS ASSESSMENT – % F-2-F</b>			
Problem Solving	8%	Help students prepare for the short tests and the final examination. Are based on tutorial type problems.	1,2,3
Field Trip Report	2%	Help students to realize the practical applications of the communication systems taught.	4
Short tests 1 and 2	20%	To test students what they have learned from the lectures and tutorials and are based on knowledge, comprehension, applications.	1 and 2,3
Weekly Labs & Project or extend. Lab Project and Presentation	20% <b>Options 1.</b> Labs 6 (10%) *Project Report (6%) Project Presentation (4%). <b>Options 2.</b> Labs 9 (15%) *Ext Lab Project Report (3%), Ext Lab Presentation (2%).	This will help students' ability to construct the circuits and analyze data obtained from the experiments and draw scientific conclusions and improve their presentation skills.	4

To monitor students' progress and develop them as independent learners, I use formative assessment and to evaluate their learning I use summative assessment at the UG level. Also, weekly activities are organized to keep them engaged with the subject and to further enhance their learning. I make sure that assessment questions are not available online but are still doable and some questions are research-based with specialized components depending on the level of the course I teach. The assessment questions are such that students have the opportunity to work out the solutions themselves. **For example**, PH302 students use an online model to get the ionospheric parameters and compare with what has been observed experimentally and explain the reasons for agreement and disagreement. And for the course PH402, one of the assignment is based on the theory to calculate the waveguide mode parameters and then calculate same parameters using the data observed at USP and discuss the agreement and disagreement between both and any limitations with the data and the sources of biases and uncertainty. Appropriate RSD based rubrics are designed and utilized (e.g. PH206 Lab and SC400, **Annexure VI**) for the assessment of specific assignments and lab/project reports. I also use diagnostic type assessment primarily for my research students mainly through discussion and interviews that help me to identify the weak and strong skills of the students and advise them to build on the strong skills and improve/develop the skills that are required to complete the specific objectives of their research projects. I regularly remind students the importance of academic ethics, mainly about the plagiarism (USP H&C, 2018, pp 462-468) and its penalties.

Feedback has a significant effect on students' continuous development, effective learning and successful completion of their courses/programme. I believe in constructive and timely feedback. The timely feedback is important as the solution of assessment is still fresh in students' mind to realize the strength and weaknesses of their solution. I place the responsibility of learning on to the students and support and guide them for becoming independent learners and strong team players. The assessment items which are assessed (e.g. problems and project reports) through moodle the feedback is provided in the feedback section, and the solutions to problems are posted on to moodle so that students can compare their solution with my solution. Feedbacks on topic tests (Test 1 and 2) is provided by posting the solutions onto Moodle and by giving feedback on marked manuscripts where students have made mistakes and explain why marks were deducted. I encourage students to contact me through email and preferably face-to-face if they are not satisfied with the feedback. The tests are good indicators of the students learning, while I encourage high achievers I also organize one to one session with students with low performance. The samples of feedback are:

a) *Assignments (Tutorial problems)*: PH302, 2018, <https://elearn.usp.ac.fj/course/view.php?id=396>

1. Part I: 5/5, Part II: 2/2, Part III: 1/3, (-2) you have not multiplied the time and area to get the final answer. Total Marks: 08/10. Well done!
2. Total Marks: 06/10, Part I: 4/4, Part II: 0/4 The  $k$  of the system remains constant. So first calculate  $k$  from part I ( $k = \Delta f / V_{max}$ ). The new  $\Delta f = k \times V_{max} = \Delta f$  of part I. The  $\Delta f$  will remain same. Part II: 2/2

b) *Extended Lab projects*: PH302, 2018, <https://elearn.usp.ac.fj/course/view.php?id=396>

1. Total Marks: 18.5/20, Aim and Introduction: OK, Observations and Results: OK, Discussion: Need to revised- you need to write what is the meaning of the data-what do your

results indicate. Do your results match with theoretical values? Any reason for the difference between theoretical and experimental observations? (-1.5 marks). *Conclusion: OK. Very Good.*

The impact of the constructive feedback can be seen from the score against one of the questions on *helpful feedback* in the students' evaluation of the courses (SEC). The students score against this question can be checked online <https://mis.usp.ac.fj/csrs/>. For my UG course PH302, which I am teaching from several years, the SEC score on feedback is always above 80%, which for last three years was 92.86% (2018), 85.71% (2017), 88.89% (2016) and 100% (2015). I taught PH206 (~50%) in 2015 in which this question had the score of 91.67%. The PG course SC400, which I coordinate and teach along with guest lectures, the SEC score for this question is, 86.96% (2018), 93.33% (2017) and 84.62% (2016).

I use two-tier approach to give feedback to the students with the aim to motivate and inspire students to do better: 1) to provide the constructive feedback through the individual assessments, 2) to provide the feedback to the entire class on each assessment items by telling the class average and standard deviation and then comparing it with previous years and tell them where the class stands as compared to previous years.

Student feedback (positive or negative) that I receive through the university feedback process (SEC reports), and that by informal/formal chats (e.g., during the lab time) is incorporated in the effective delivery of the courses. *For example*, lab manuals have been revised/updated considering SEC reports and the feedback I have received from the students also.

#### *Sample Comments of Students:*

- Has given continuous feedback on my progress which has allowed me to pursue physics at the postgraduate level. Has always kept eyes to avoid making mistakes to become a competent scientist.
- Dr. Sushil is the only lecturer that I have come across that gives feedback after he assesses our assignment and tutorial questions. The feedback he gives is so straightforward and honest, we learn a lot from feedback he gives.
- Provides effective feedback on assignments and test paper from where we learn our mistakes and improve on it.
- Prof. Sushil Kumar always gave me specific feedback based on my progress and always encouraged me to work within the time frame

Sustained impact of my approaches on student assessment, feedback and learning in a way can be seen by consistent good pass rates of the courses that I have taught and coordinated both at undergraduate and postgraduate levels over the years. *For example*, PH302 had pass rates around 85-90% and PH206/203/205 around 80%.

#### 4. Respect and support for the development of students as individuals

Respectful and ethical behavior is one of the USP staff attributes, and professionalism and ethics is one of the students' graduate outcome. First of all, I maintain a very respectful and ethical behavior with the students throughout the courses I teach. I begin with my introductory lecture by acknowledging the diverse range of cultural backgrounds we all have come from. To cultivate respect for each other, I treat all the students equally and very well. For the laboratory classes, I form lab groups of students with diverse cultural backgrounds and promote friendship and respect trying to form each other and among groups.

To give students a sense of feeling that they all are equal, respected and important in the course, I try to remember the names of the students, though some of them may be difficult to pronounce, but I try my best to call them by name. My aim is to create a positive and respectful learning environment in all the learning activities (lecture, tutorial, labs, extra support) that supports students and promotes their interest in the subject and motivates them for higher learning.

I do encourage students for one on one consultation particularly to those who are at risk and physically challenged and facilitate meetings in which I first try to make them believe that I care and respect them so that they feel comfortable to communicate irrespective of the depth of the problem which I try to address most professionally.

As individuals, students tend to have areas in their subjects which they are confident in. Similarly, they have areas in which they are lacking. I encourage students to grasp harder on topics they are strong in (**For example**, a student interested in research was strong in data analysis and interpretation, where I strongly encouraged him to take up the master's research project using satellite/ground-based observations, which he completed well in time and later published his research). Nevertheless, I still make full efforts to help all students to become comfortable with challenging topics by breaking them down the topics to basics.

To USP students come from diverse regional backgrounds and a small of students from non-regional countries (international students). A large number of students come from a rural and remote background with limited family support and lower socio-economic backgrounds. The international students are mostly frank and bold and do not hesitate to request for a meeting for a discussion/clarifications that is what I have observed from SC400, whereas regional students mainly from the remote background are shy and hesitant which I acknowledge and consider as a risk to these students. I try to identify such students and interact with them mainly during the laboratory times and encourage them for interaction (face-to-face) with the teaching team and support them. Face to face meeting is important to develop a respectful relationship apart from solving the students' problems. Also, there are the students who find difficult to manage their time and organize their workload, I encourage such students to see me where I try to find out how do they spend their time and try to make my suggestions for better time management and then advise them to further liaise with faculty learning support team. Nevertheless, I am equally committed to supporting international students. My primary objective is to give students ownership and responsibility for their Physics learning and academic performance by becoming independent learners, critical thinkers, and problem solver.

### *Sample Comments of Student Nominees:*

- He showed his respect from the way he communicates with his students. The way he speaks is so gentle and humble. As said before, he shows his support by encouraging us to do well in our studies.
- Prof Kumar always uplifts his students by praising them and helping them realize their true potential. Prof Kumar always has a cheerful and approachable personality and makes his students comfortable talking to him.
- He is always humble and ready to help the students. I have never seen him get angry on any of this students and is always ready to work in collaboration with the students and the other teaching staff.
- Prof. Sushil Kumar always created an open, friendly and trusting study and research environment.

## **5. Scholarly activities that have influenced and enhanced learning and teaching**

I have carried out several professional activities to enhance learning and teaching:

- Conducted information and proposal writing sessions/workshops to the Australian Centre for International Agricultural Research (ACIAR) students at Alafua Campus, Samoa, during 2013 and 2014. The ACIAR, in partnership with USP, have established an ACIAR-USP Postgraduate Scholarship Scheme in 2008 which is managed by the Faculty of Science, Technology and Environment and the Faculty of Business and Economics. These workshops were organized keeping in view of limited research support to the Alafua campus students as compared to Laucala students. The impact of such workshops along with current support has been the better Master's completion rate (completed, 50.00%, in progress, 22.22%, pending, 16.67% and fail 11.11%).
- Conducted "Getting Started in Research" workshops for FSTE research students during sem I, 2014-2016 for newly registered students to help them writing the research proposals and build into the research.
- Conducted short workshops this year (Feb – Mar 2018) for the FSTE research students on Literature Review (collecting, organizing, critically reading and writing), problem research statement, aim, objectives, methodology, work plan and budget. Finally, writing a scientifically sound and technically valid project which is *clear, precise, up to the point and coherent* within the given time limit of 7 weeks.

The impact of these scholarly activities has been on students submitting their better-written research proposals in time to the Faculty Research Committee.

I have coordinated and managed courses both at UG and PG levels using various course management tools starting with *Class Share* and *WebCT*, at times when such management tools were hardly used at USP. Nowadays, I use moodle very effectively for managing as well as evaluating the students' performance and providing timely feedback.

I was an active member of the STAR project at the Physics discipline and at the school level under which we designed the programme outcomes and courses learning outcomes consistent with programme outcomes. It was an intensive academic exercise where we reviewed and updated all Physics courses to bring them to the form offered until 2017 and the present form (2018) after Physics programme review in 2017. I have been a member of the RSD group/committee at the USP level as Associate Dean, Research and Graduate Affairs. I have attended the meetings/workshops organized by the research office, USP, and have also helped in conducting by suggesting the particular examples to be presented that would be suitable for FSTE. The knowledge and skills gained by working with RSD group and attending workshops have been used to design the RSD based rubrics and change the teaching practices for better assessment and delivery of the courses. I have been the member of Physics Program Committee (PAC) as a staff and as Physics Divisional Coordinator (2207-11) as AD R & GA until now. Based on the Physics stakeholders feedback I have contributed to the revision of the courses at the programme level.

I have continuously enhanced by professional knowledge by conducting high-quality research, supervision, research collaborations, visiting international research facilities, and attending the conference and workshops at the local and international levels. Sound professional knowledge is essential for effective subject delivery and learning activities. I have been proactive in changing my teaching practices to transfer my knowledge to students gained through the above activities. *For example*, when teaching a topic on the ionosphere, ionospheric irregularities and fading on satellite signals (GPS) the data/results obtained at Physics USP were presented to the students (PH302). *For another example*, in one of the conferences I attended, I found during one of the presentation by an excellent researcher (Dr Morris Cohen, Georgia Institute of Technology, USA) known to me, a slide on the real-time recording of lightning discharge and the downwards propagation of lightning breakdown. I requested him if he could share that recording clip to me that I used to show to the students when teaching a topic on electrical breakdown and working of the lightning conductor/protector (PH206). Please see attached (Annexures) the **ppt copy** of the presentation slide given by Dr Cohen; you will enjoy it!!

I have not published research related to teaching in journals. However, I have developed and revised the UG Laboratory manuals for various courses in Physics as mentioned in criterion (1) that have significantly enhanced the delivery of the courses and enhanced students' learning.

While maintaining a strong research profile in my area of Space, Atmosphere and Natural Hazards, I have published papers in A\* and good rank journals in collaboration with highly reputed institutions across the world (e.g. Otago University, NZ, University of Newcastle, Australia, Duke University, USA, Stanford University, USA, Technical University of Denmark, Indian Institute of Geomagnetism, India) consistently that have influenced and motivated the students to pursue their research degrees and publish their research work.

#### *Sample Comments of Student Nominees:*

- Dr Sushil, he uses his professional knowledge, that is, his research work to apply it to the resources of the units he is teaching; hence improving learning and teaching with the authentic and quality notes from his research.
- Prof Kumar is an excellent and understanding research supervisor.
- Has the highest number of publication and because of his contribution, his recognizance with other universities. Has a capacity of further uplifting the research standards for USP.

To **conclude**, I believe in well-planned lectures, delivery, conducive and interactive classroom environment, closer relationship, honesty, and respect with students. Using different approaches of teaching and students' engagement, my aim is to encourage students to acquire the knowledge and skills to become critical thinkers, problem solvers, and lifelong learners. The application PBL and research integrated teaching has been one of my strengths for the effective teaching. I have developed variety of resources including high-quality research facilities in Fiji and in the region to enhance the students' learning both at UG and PG levels and USP's internationalization. I believe in the learning-oriented assessment of appropriate level consistent with teaching/learning activities and learning outcomes, and timely and constructive feedback. I strive for the continuous development of my teaching and research skills.

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### **Attachments:**

1. Annexures I (PH106), II (PH205), III (PH101), IV (PH203), V (PH206).
2. Annexure VI (a,b): RSD based PH206 Lab Marking and SC400 Assignments 2 and 3.
3. Annexure VII (a, b, c): PH302 QoT (2010, 2013, 2014).
4. Sample Handouts-PH206, PH302.
5. Lightning video recording- By Dr. Morris Cohen, GIT, USA.

*Total Length:* 6540 words plus pictures

Professor Sushil Kumar

**23 July 2018**