



اللجنة العمانية للرياضيات
Oman Mathematics Committee



جامعة السلطان قابوس
Sultan Qaboos University

From: Magda Talib Al Hinai,
Ph.D. Chair of Oman Mathematics Committee

To : Prof. Dr. Helge Holden
IMU Secretary
International Mathematics Union

Subject: Application of Sultanate of Oman for IMU Full Membership

Dear Members of Executive Committee of IMU,

The Sultanate of Oman has joined the IMU as an associate member in 2010. Later, in 2011 the Council of Ministers took a decision to establish Oman Mathematics Committee (OMC) - formerly known as "the National Committee of Mathematics Experts in Oman" – as the adhering body.

Information on the status of Mathematics in Oman is found in the attached document. This document has been prepared for the fulfillment of the requirements of the International Mathematics Union to change the membership of the Sultanate of Oman to full membership (Category 1).

Looking forwards to receiving your reply on the present request of the Sultanate of Oman.


Sincerely Yours,
Magda Talib Al Hinai

الموافق : ١٨ / ٤ / ٢٠١٨م

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Oman Mathematics Committee

**Report on
The Status of Mathematics in Oman
April 2018**

**Delivered to
The International Mathematics Union (IMU)**

**For the Fulfillment of the Requirements to change
The Sultanate of Oman Associate Membership to
Full Membership of the IMU**

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PREFACE

The Sultanate of Oman is located on the southeast coast of the Arabian Peninsula. Its capital city is Muscat. The area of Oman is more than 300,000 km² and has a long coast line of about 1700 km. The population of the Sultanate is about 4.5 million. Main language is Arabic. Also, English is widely spoken and taught in different levels of schools and universities. Oman is known for its beautiful mixed geography and culture where you get beautiful beaches, high mountain areas, dessert areas and more.

Oman acknowledges the strength of mathematics as a science in all forms – pure, applied and educational. It being an evolving subject, Oman is keen to promote international cooperation in mathematics on a higher and permanent level and thereby desires to build full time membership linkages with IMU. It believes that the mathematics culture will generate opportunities for the creating immense diversified progress and give a powerful boost to education in Oman, encourage valuable research and create new careers relating to Mathematics.

Oman became International Mathematics Union (IMU) Associate Member because of the 16th General Assembly of the International Mathematical Union, which took place in Bangalore, India, on August 16-17, 2010.

The decision of the Council of Ministers of Oman in 2011 enabled the establishment of a National Committee of Mathematics Experts in Oman, currently known as Oman Mathematics Committee (OMC). The Sultanate was keen to form a committee dealing with Mathematics affairs and studying its local effect and potentials. This reflects the scope of awareness of the government and citizens about Mathematics and its importance in the development of the country.

Among the responsibilities of OMC is to strengthen the ties with IMU by changing the status of Oman from Associate member to full membership. This will allow increase in activities and services to the mathematics community in Oman. In addition, OMC has many other responsibilities to accomplish; those will be discussed elaborately at the end of this document.

It also validates the fact that the Sultanate is functioning and adopting approaches by taking advantage of the positive outcome of many countries, which include financial gains and development. These accrue from improved standards of Mathematics and Science in those countries.

Mathematics since decades is a crucial facet of human thought and logic, and indispensable for understanding the global scenario and self-introspection. The role of Mathematics in forming mental discipline and providing an impetus to logical reasoning and mental exactness is indisputable. A recent study at Stanford University in the United States of America in the field of economic analysis of educational policies shows that the rate of economic growth is directly proportional to the results of international tests in teaching Mathematics and Science such as TIMSS and PISA.

In light of this, OMC is seeking to play its role fully and do the needful to raise the quality of educational output level in Mathematics in Oman, as well as increase research output in Mathematics, both scientifically and educationally.

This document is prepared in adherence to the framework of the IMU Guidelines of the application process for IMU Membership as cited on IMU website. It will be presented to IMU for the fulfillment of the requirements to convert the membership status of the Sultanate of Oman from an Associate member of IMU to full membership.

1. The number of Universities and University Colleges in the Sultanate of Oman where Mathematics is taught

The Oman Academic Accreditation Authority (OAAA) regulations has made it mandatory for all higher education institutions in Oman to include Mathematics as one of the components of the General Foundation Programme (GFP).

The GFP is a formal, structured program of study in Oman that primarily focusses on the achievement of the Student Learning Outcomes in four areas (Mathematics, IT, English Language and Study Skills).

The main objective of the GFP is to enable students to efficiently pursue their higher education. It is a compulsory entrance qualification to all undergraduate programs offered in Oman. Mathematics is also taught at the undergraduate levels, for mathematics majors and for other majors (engineering, sciences, economics, IT etc.) that need higher courses of mathematics. Moreover, some higher education institutions in Oman offer M.Sc. and Ph.D. degrees in Mathematics and Mathematics Education.

Table 1: Distribution of universities and colleges in Oman

Public Universities	Private Universities	Public Colleges	Private Colleges
1	8	13	31

2. List of Universities with Significant Research Activities in Mathematics

Research in Mathematics is significantly active in Oman. A good number of specialized Mathematicians are doing research in many fields of Pure and Applied Mathematics as well as Mathematics Education. They are also collaborating with researchers from other disciplines in solving problems related to mathematics.

Sultan Qaboos University, SQU, is the most dominant in Mathematics research through the Department of Mathematics and Statistics, DOMAS, which is among the largest departments at SQU. Other universities like Nizwa University, NU, and the German University in Oman, GUtech, also conduct mathematics research.

A list of the Mathematics research groups in these universities is found in Appendix 1A, also, Appendix 1B tabulates the funds of the Research Council (TRC) in Oman to a number of Mathematics research projects.

3. The Number of Professors in Mathematics in Oman (estimate)

In all higher education institutions in Oman, there is around 330 professors in Oman, table2, Appendix 2 gives a plot of the estimated number of professors in mathematics per higher education institution.

Table 2: Distribution of mathematics professors in Oman

Full Professors	Associate Professors	Assistant Professors	M.Sc. Holders	Total
15	34	123	160	332

4. The Number of Active Research Mathematicians in Oman (estimate):

A total of 169 active research mathematicians are distributed among 29 higher education institution, as per Appendix 3

5. A List of Mathematical Societies in Oman

Starting from 2015, activities of OMC in teaching Mathematics spread nationwide. Many participants showed keen interest in contributing to Mathematics and Mathematics Education in Oman. In order to accommodate such demands, OMC is currently taking the initiative to establish two mathematics societies in Oman; Oman Mathematical Society (OMS) and Omani Women Mathematical Society (OWMS).

6. A list of Mathematicians, whom the country considers well known in the worldwide Mathematical Community

Table 3 below lists mathematicians in Oman who have published good quality research which qualified them to reach the level of Associate and Full Professors. Researchers listed below have 100 or more citations according to Scopus or Google Scholar.

Table 3: Renowned Mathematicians in Oman

#	Name	Ph.D. and Specialty
1	Al-Baali, Mehiddin <i>Professor, SQU</i>	Ph.D. 1984, University of Dundee, UK Numerical optimization
2	Bernahard Heim <i>Professor, GuTech</i>	Ph.D. 1996, University of Mannheim, Germany Number Theory, the Founder of Kaizen Learning
3	Chandran, Pallath <i>Professor, SQU</i>	Ph.D. 1979, Indian Institute of Tech, New Delhi, India Porous media flow, MHD
4	Eltayeb, Ibrahim A <i>Professor, SQU</i>	Ph.D. 1972, Newcastle University, UK Fluids dynamics, Mathematical modeling.
5	EkkehardHolzbecher <i>Professor, GuTech</i>	Ph.D. 1991, University Berlin, Germany Mathematical Modeling
6	Khan, Mohammad S <i>Professor, SQU</i>	Ph.D. 1982, La Trobe University, Melbourne, Australia Fixed Point Theory
7	Khan, Qamar Jalil A <i>Professor, SQU</i>	Ph.D. 1980, Indian Institute of Technology, Kanpur, India Bio-mathematics
8	Krishnan, Edamana <i>Professor, SQU</i>	Ph.D. 1979, Indian Institute of Science, Bangalore, India Non- linear waves
9	Sacheti, Nirmal Chand <i>Professor, SQU</i>	Ph.D. 1976, Rajasthan University, India Free convection, porous media, magneto-hydrodynamics
10	Vladimir Vladimirov <i>Professor, SQU</i>	Ph.D. 1979, USSR Academy of Sciences, Russ Fluid Dynamics.
11	Abdelbasit, Khidir <i>Associate Prof., SQU</i>	Ph.D. 1980, Newcastle-Upon-Tyne University, UK Applied statistics and design of experiments
12	Al-Salman, Ahmed <i>Associate Prof., SQU</i>	Ph.D. 1999, University of Pittsburgh, USA Harmonic Analysis
13	Anchouche, Boudjemaa <i>Associate Prof., SQU</i>	Ph.D. 1994, Paris Sud, Orsay, France Differential geometry
14	Balakrishnan, Easwaran <i>Associate Prof., SQU</i>	Ph.D. 1996, Massey, New Zealand Dynamical Systems and Mathematics of combustion.
15	Bakheit, Charles Saki <i>Associate Prof., SQU</i>	Ph.D. 1982, University of Durham, UK Data analysis and Stochastic Process
16	Boudelloua, M.Salah <i>Associate Prof., SQU</i>	Ph.D. 1986, Nottingham University, UK Control theory and multidimensional systems theory
17	El-Bashir, Tayfour <i>Associate Prof., SQU</i>	PhD 1995, University of Leeds, UK Computational fluid mechanics
18	Boulbrachene, Mesaoud <i>Associate Prof., SQU</i>	Ph.D. 1987, Besancon, France Applied Analysis, Numerical analysis.
19	Islam, Mazharul <i>Associate Prof., SQU</i>	Ph.D. 1992, Banaras Hindu University, India Statistical Modeling of Human Fertility (Demography)
20	Kamal, Aref <i>Associate Prof., SQU</i>	Ph.D. 1983, University of Newcastle, Upon Tyne, UK Function analysis and abstract approximation theory
21	Karaa, Samir <i>Associate Prof., SQU</i>	Ph.D. 1996, Paul Sabatier University, Toulouse, France, Iterative methods for solving large sparse systems
22	Kerbal, Sebti <i>Associate Prof., SQU</i>	Ph.D. 1998, University of Ottawa, Canada Optimal control theory
23	Makhmutov, Shamil <i>Associate Prof., SQU</i>	Ph.D. 1985, Moscow State University, USSR Spaces of analytic functions
24	Manhas, Jasbir S <i>Associate Prof., SQU</i>	Ph.D. 1991, Jammu University, India Special classes of operators on function spaces

25	Mahmood Khalid Jasim <i>Associate Prof., SQU</i>	Ph.D. 1999 Roorkee University (IITR), India, Mathematical Modeling, Numerical Analysis.
26	Purnama, Anton <i>Associate Prof., SQU</i>	Ph.D. 1988, Cambridge University, UK Sediment transport and pollutant transport
27	Rahman, M. Mansur <i>Associate Prof., SQU</i>	Ph.D. 2003, University of Glasgow, UK Magneto-hydro-dynamics, Fluid Mechanics, Nano-Fluids,

7. Estimated Number of International Mathematics Publications:

The estimated number of refereed mathematical publications, produced by mathematicians living in Oman is averaged over the past few years to 71 publications per year.

8. Mathematical journals published in the country

There are no mathematical journals published in Oman so far. However, SQU publishes Journal for Science, Journal of Educational and Psychological Studies, and Journal of Engineering Research, which include papers in pure and applied mathematics as well as mathematics education. These journals are available at

<http://web.squ.edu.om/squjs/index.html>

<http://web.squ.edu.om/coe/Publications/College-Journal>

www.tjer.net

9. An Overview of Educational Activities

In Oman, the recent rapid development of information and communication technology has diversified the pedagogical approaches in all levels of education, whether in K12 or higher education. Consequently, and as in other subjects, new instructional approaches of mathematics have appeared, implementing computer-based/web-based teaching and learning (blended learning approaches).

Autonomous learning, also, has become a feature among students, who independently explore blended learning through virtual mathematics platforms and mathematics mobile applications.

A- Mathematics in Pre-University Education:

The Sultanate of Oman participated in TIMSS 2007, TIMSS 2011, and TIMSS 2015, with the objective of developing and improving its educational system. The last TIMSS 2015 report showed that there is a slight improvement in the international ranking of Oman compared to the previous. In addition, the Ministry of Education (MoE) revised completely the curricula of mathematics for grades 1 through 10. Besides, it reviewed the assessment system of Mathematics to adopt a new assessment system that trains students on higher levels of thinking and critical thinking.

Much more is carried out by the MoE, that introduced several initiatives to improve Mathematics Education, for example; Cognitive Development program, Mathematics Gulf Olympiads, Oman Science Festival and more, the adoption of Cambridge Mathematics curricula. More details are found in Appendix 4A

B- Mathematics in Higher Education

As mentioned earlier, all higher education institutions offer mathematics courses whether on the foundation level or higher. SQU is so far the only institution offering Ph.D. and M.Sc. in mathematics and mathematics education. Currently, University of Nizwa is proposing a new M.Sc. program in Mathematics.

SQU also shows great efforts in improving teaching and learning, by establishing two new centers, namely, Independent Learning Center (ILC) and the Center of Excellence in Teaching and Learning (CETL). The two centers focus on teaching and learning in all subjects including mathematics. Besides, some remarkable activities are carried out in other higher education institutions to improve

the teaching and learning of mathematics. Appendix 4B elaborates on all Mathematics Educational efforts and initiatives in higher education institutions in Oman.

10. Additional Information

Establishment of Oman Mathematics Committee (OMC)

Oman Mathematics Committee (OMC) formerly known as "The National Committee of Mathematics Experts in Oman" was established by a decision of the Council of Ministers in 2011. OMC acts as the link between IMU and all institutions specialized in mathematics in Oman. In 2015, OMC was reformed to start its current activities and services to the community of mathematics in Oman. OMC believes that to guarantee the effectiveness of its services, it should cater for all scopes of mathematics; starting with K12 mathematics through research in Mathematics.

Oman Mathematics Day

In November 2015, OMC organized the first version of Oman Mathematics Day, with the theme "Technology in Teaching and Learning Mathematics". OMC also held a 3D Imaginary Exhibition and an exhibition for Students and Educators in mathematics to display their projects. Besides, a set of workshops were held in parallel to the events of Oman Mathematics Day I

In November 2016 and in celebration of Oman Mathematics Day II, OMC organized an International Conference on "Trends in Innovative Mathematics Curricula". Several invited speakers from USA, Finland, Singapore, and Lebanon participated. Preconference workshops have been held for three days; also, other workshops ran in parallel to the conference. The committee also organized the Second Exhibition for Projects in Mathematics during the celebration of Oman Mathematics Day II, November 2016.

Oman Mathematics Day III was held in the period 20 - 22/11/2017. Oman Mathematics Day III conducted an International Conference in on "Trends in Innovative Mathematics Curricula" with one of its sessions devoted for Early Mathematics Education, this goes in alignment with the Ministry of Education plans to deploy Cambridge Mathematics Curricula starting fall 2017. In parallel with the event, OMC organized several workshops.

Every year Oman Mathematics Day raises recommendations to all entities in Oman that deal with K12 mathematics curricula for consideration.

OMC Recommendations:

OMC is considered as the reference in all issues related to mathematics in Oman. In addition to the recommendations that OMC delivered in the closing ceremony of Oman Mathematics Day, OMC also provides advice and recommendations to any entity in Oman that is handling mathematics, like schools, higher education institutions whenever the need arises.

Recently, logistics sector has gained an increasing interest as an important enabler of the national economic diversification program in Oman. As immediate interaction with the current situation in Oman that urges diversification of economy, OMC released the following recommendation to SQU and all other Higher Education Institutions, *"To include Operation Research among its mathematics core courses and not just as an elective course."*

OMC Electronic Newsletter

In fall, 2016 OMC launched the first issue of OMC Electronic Newsletter. It appears semi-annually covering OMC news and news of mathematics events held in Oman and in the region. OMC newsletter also highlights achievements of mathematicians in Oman and their contribution.

OMC Award

- 1- OMC Award version I 2015, *"Best Mobile Application in Teaching and Learning Mathematics"*.
- 2- OMC Award version II 2016, *"Best Mobile Application in Teaching and Learning Mathematics" and Best On-line Mathematics Exam for the GFP*.

OMC Mathematics Education Workshops and Research Workshops

In view of the feedback received by OMC from experts and participants of the first Oman Mathematics Day, and in order to improve in-service training courses and workshops for all staff in

the educational field, OMC started regular monthly training workshops targeting teachers and educators in Oman. These sessions commenced in 2016. They were held every month in a different state in Oman reaching big cities as well as remote areas. Those monthly training workshops were in the framework of the theme of Oman Mathematics Day I; blending technology in teaching mathematics.

OMC had set few objectives for those workshops, specifically:

1. To encourage the use of technology in teaching mathematics at schools and in higher education.
2. To focus on mathematics teaching strategies that enhance higher orders of thinking skills.
3. To improve teaching and education practices according to new trends.

In January 2017, OMC launched its first series of International Workshops in Mathematics Research (IWMR). Those workshops aimed to bring together mathematicians from all over the world, to think about and discuss topics in both pure and applied mathematics. Annually OMC is planning to organize two to three research workshops per semester. OMC encourages workshops that serve research topics that are in relevance to Oman. Appendix 5A lists OMC training of teachers and educators workshops and IWMR in the period 2015 – 2017.

In April 2018 OMC organized an International Conference on "Operation Research and Applications".

Appendix 5B lists other mathematics activities held in Oman in the period 2011-2017.

Appendix 1A

Research Groups in Universities in Oman

SQU Research Groups

- 1- Approximate and Exact Analytical Methods for Solving Nonlinear Dispersive Wave Equations.
- 2- Porous media non-Newtonian Fluid Dynamics.
- 3- Magneto Hydrodynamics.
- 4- Fractional Differential Equations.
- 5- Vibrodynamics.
- 6- Nanofluid: Emerging Applications in Nanoscience and Nanotechnology.
- 7- Robust Numerical Methods and Fast Iterative Solvers for Flow Problems.
- 8- Prey-Predator Models
- 9- Epidemiological Models
- 10- Epidemic Models

GUTech Research Groups

- 11- Fourier Coefficients of Powers of the Dedekind Eta Function.
- 12- Symmetries and Borchers Lifts.
- 13- Towards a flood- Resilient Omani Society: Improved Tools for Flood Management.
- 14- Computer-Based Analysis of the Stochastic Stability of Mechanic Structures Driven by White and Colored Noise.

Nizwa University Research Groups

- 15- Analysis, Topology, and Geometry.
- 16- Mathematics Education.
- 17- Mathematical Physics.
- 18- Mathematical Modeling on Greenhouse Gas Emission.
- 19- Theoretical and Computational Fluid Dynamics.

In addition to research in Mathematics, Oman also has significant research and studies in Mathematics Education at the Ministry of Education and the College of Education at SQU.

Appendix 1B

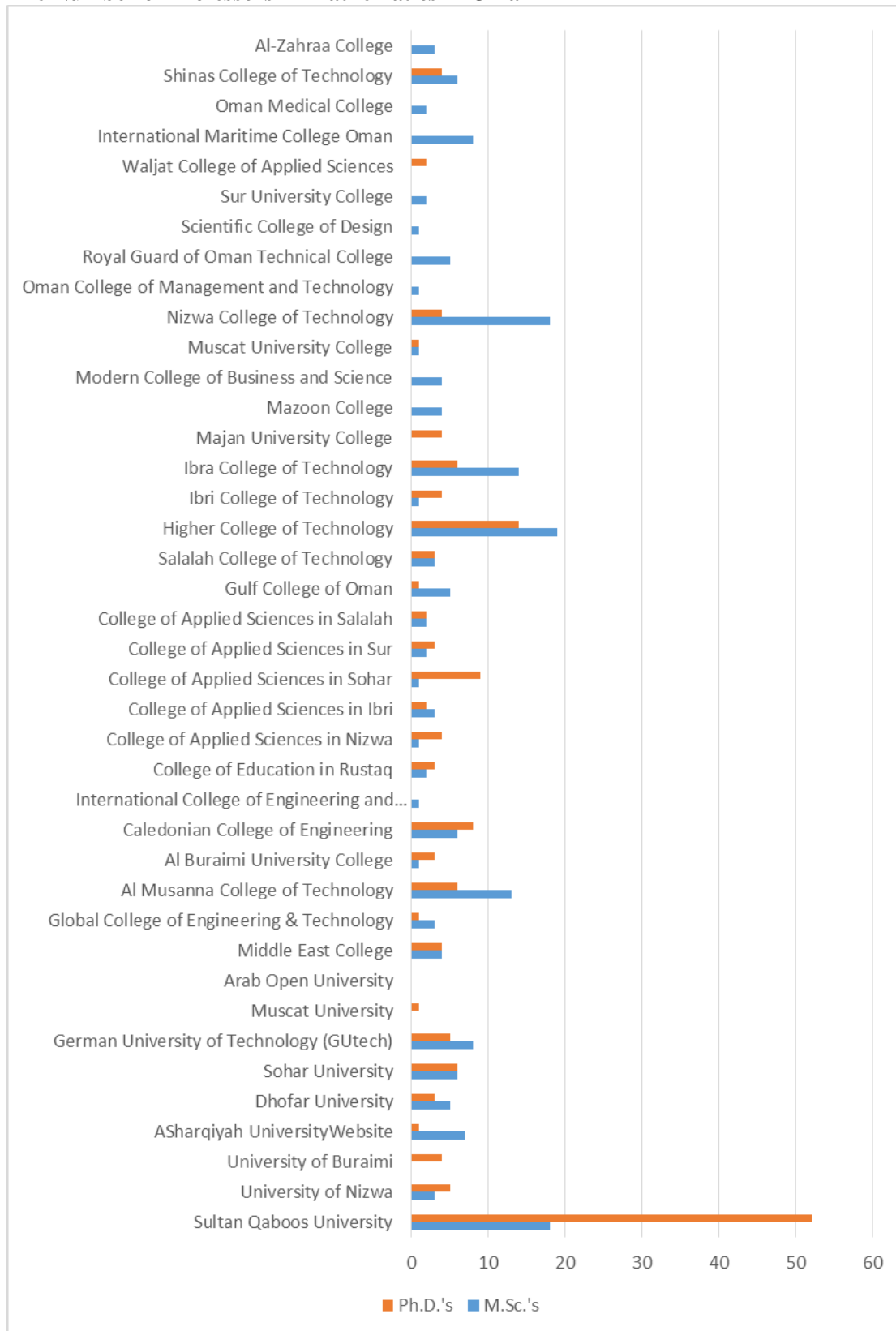
Mathematics Research Funds

The Research Council (TRC) in Oman offers several research grants (see table), which cover Mathematics research areas that are relevant to Oman.

Institution	Title of Project	Amount
SQU	1- Fractional Differential Equations: Theory, Methods and Applications	212,000 US dollar
	2- Nano-fluid: Emerging Applications in Nanoscience and Nanotechnology	410,000 US dollar
	3- Robust Numerical Methods and Fast Iterative Solvers for Flow Problems	288,000 US dollar
	4- Studies in Semigroups of Contraction Mappings of A Finite Chain	153000 US dollar
GUTech	1- Towards a Flood- Resilient Omani Society: Improved Tools for Flood Management.	255,000 US dollar
	2- Computer-Based Analysis of the Stochastic Stability of Mechanic Structures Driven by White and Colored Noise.	242,000 US dollar
Colleges of Technology	1- Analysis and Enhancement of Existing Traffic Signal System at Various Locations in Nizwa.	1500 US dollar

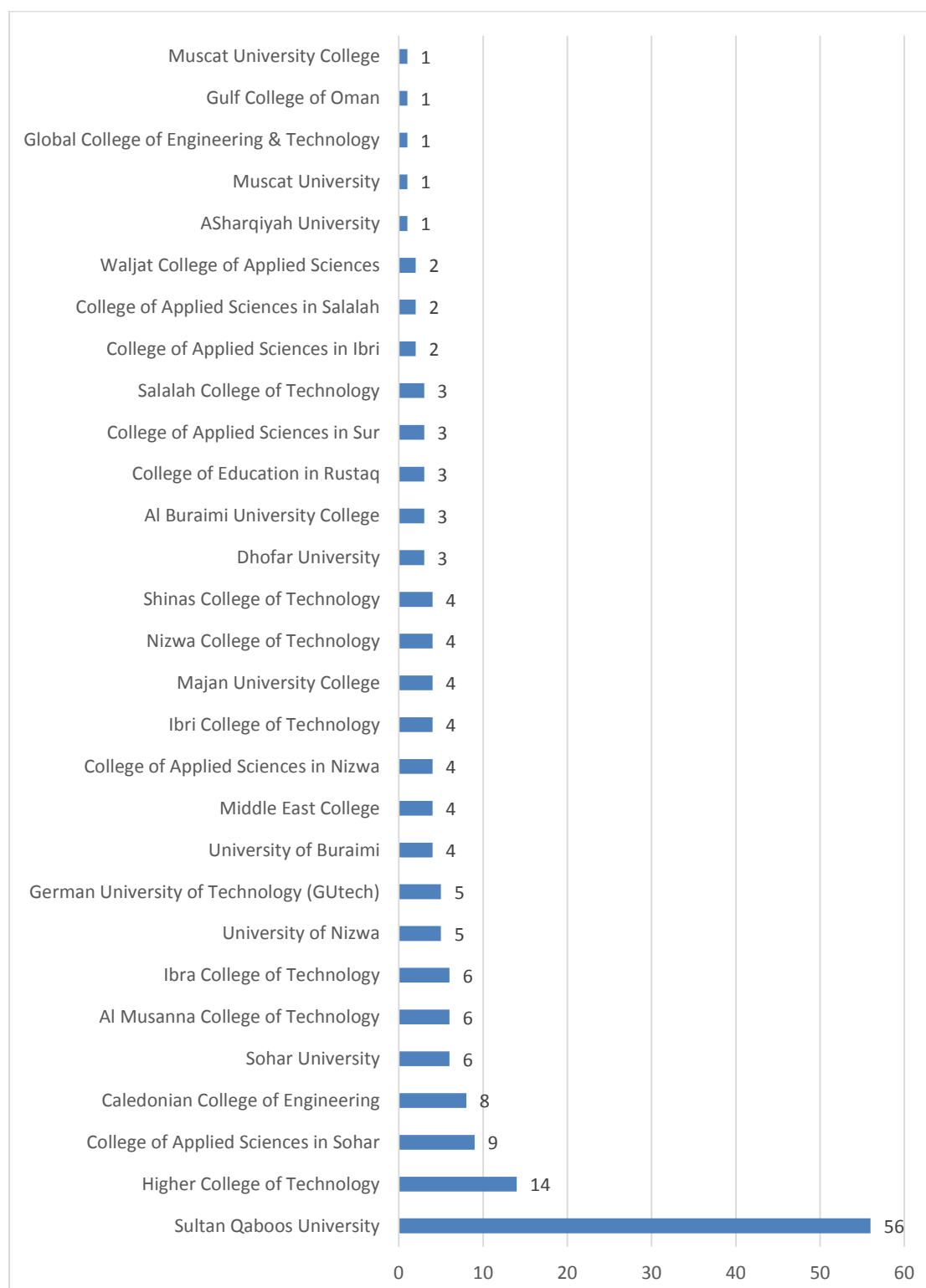
Appendix 2

The Number of Professors in Mathematics in Oman



Appendix 3

Estimated Number of Research Mathematicians in Oman



Appendix 4A

Mathematics in Pre-university Education:

The Sultanate of Oman participated in TIMSS 2007, TIMSS 2011, and TIMSS 2015, with the objective of developing and improving its educational system. Following publication of the results and international reports by IEA, Oman formed two teams, one for mathematics and one for science, composed of mathematics and science curricula officers, regional supervisors, and assessment officers. The teams reviewed international reports on mathematics and science before submitting recommendations for the consideration of decision makers at the MoE. Most of these recommendations were related to the variables included in the study instruments (questionnaires), as well as how to link these variables with the levels of student attainment in the TIMSS 2007 and 2011 cycles. Both cycles had a direct impact on curricula and assessment in the Omani educational system, as follows:

- **Curricula**—The scope and sequence of both the mathematics and the science curricula were revised completely for Grades 1 to 10. Certain learning outcomes were moved from one grade to another. New outcomes were introduced for some grades to bring them in line with international scope and sequence. Topics covered by TIMSS 2007 also were taken into consideration.
- **Assessment**—The low performance of Omani students in TIMSS 2007 and TIMSS 2011 was attributed mainly to their lack of familiarity with the types of questions (and the phrasing of questions) in the assessments. Subsequently, Oman has focused on training teachers in two main aspects of question development:
 - i. **Classification of questions**—Teachers have been trained on classifying questions into the four cognitive domains of Knowledge, Understanding, Application, and Reasoning. Examples for each domain have been developed based on items released by IEA.
 - ii. **Format and wording of questions**—Teachers have been trained to develop questions in line with TIMSS and to incorporate them into classroom instruction on a daily basis without explicitly linking them to TIMSS.

(<http://timssandpirls.bc.edu/timss2015/encyclopedia/countries/oman/use-and-impact-of-timss/>)

The indicators received from the last TIMSS 2015 report showed -though not what was aimed for - a slight improvement in the international ranking of Oman compared to the previous one.

Studies have showed an “Improved performance” of Omani students in TIMSS 2015.

It was with some relief, therefore, that the MoE was able to report that in 2015, in mathematics and at both grades 4 and 8, student performance showed a significant improvement on the 2011 results.

(<http://timssandpirls.bc.edu/timss2015/international-results/wp-content/uploads/filebase/full%20pdfs/T15-International-Results-in-Mathematics.pdf>)

One of the most important educational programs recently developed resulted from a directive of His Majesty Sultan Qaboos bin Said- the Cognitive Development Program for Students in Science, Mathematics, and Environmental Geography Concepts. Launched in the 2007–08 school year, the program encourages students to acquire knowledge, improve achievement, and enhance the study of practical aspects of science, mathematics, and environmental geography. The program is based on oral contests, student projects, written tests, and supporting activities, each encouraging students to conduct research and investigations, practice systematic scientific thinking, and develop their innovation capabilities.

The scientific Olympiad is a national scientific competitions for students of the public schools and private schools in the Sultanate of Oman in mathematics and general sciences for grades 7-9 and physics and mathematics for grades 10-11 to develop the skills of scientific creativity through competition in theoretical and practical fields. During the tests and practical activities that are adapted to the standards of international scientific Olympiad which focus on the higher cognitive levels (such as problem solving) and are judged by specialists and technicians according to specific criteria derived from the international Olympic standards.

In the last Gulf Mathematics Olympics 2017 (GMO), Oman achieved one silver and five bronze medals. GMO is competition organized by the Arab Bureau of Education for the Gulf States, aiming at creating the appropriate environment to raise the level of scientific competition among students of the member countries in the field of Mathematics.

Oman Science Festival 2017 in its first edition included many activities and programs aimed at visitors of different ages and different interests. It included more than 300 diverse activities in the fields of technology, innovation, mathematics, engineering, robotics and science, The festival was held in the Sultanate's 11 governorates in order to include as many visitors as possible during its five-day period outside and inside Muscat. The festival was also hosted at Oman Convention and Exhibition Center, in addition to many applied and exploratory educational experiences in various fields of science, An exhibition of student innovations in the fields of: natural sciences, mathematics, energy and transportation, engineering systems and the environment, in addition to an exciting corner of the competitions and challenge of the robot, and also included an exhibition of research GLOBE environmental program, and the award of PDO Renewable Energy, and the corner of the company.

Training of teachers to use technology in teaching as well as reviewing mathematics curricula were among Oman's priorities over the past few years. On the level of early mathematics education, Oman will start deploying Cambridge mathematics curricula in fall 2017 for grades 1 through 4. Grades 5-6 mathematics curricula will start in fall 2018, and then later in fall 2019 all other grades onwards will shift to Cambridge curricula.

Currently, there are great efforts in the MoE to train teachers to use Mathematics software in teaching and illustrating mathematics. Besides, and in order to achieve a sustainable mathematics education, a lot of good efforts is shown among educators in producing and sharing different mathematics Videos. This on its own is as a step towards using better teaching approaches that has been proven successful, such as flipped classrooms.

Appendix 4B

Mathematics in Higher Education

Below, is a brief note on Mathematics Educational activities in some higher education institutions.

SQU Department of Mathematics and Statistics (DOMAS)

DOMAS is among the largest departments in SQU with over 50 faculty members and over 7000 student registrations per semester. It offers programs leading to B.Sc. degrees in Mathematics, Statistics, and Statistics with a minor in Health Statistics. DOMAS also offers general minors in the fields of mathematics and statistics. DOMAS is also responsible for teaching all mathematics service courses offered to other majors in the SQU. Recently, DOMAS proposed a new degree of Financial Mathematics as an interdisciplinary degree between the DOMAS, College of Science, and the Department of Economics and Finance, College of Economics and Political Science, at SQU. The main strength of the proposed program lies in its interdisciplinary feature. It consists of a set of courses in mathematics and statistics (offered by DOMAS) as well as a set of courses in finance (offered by the Department of Economics and Finance). Graduates of this degree will find a wide range of interesting careers available to them. DOMAS has also a significant number of final year projects in mathematics. DOMAS students organize an annual mathematics forum that takes different themes every year. DOMAS students also have a newsletter published annually. Furthermore, the number of registrations for M.Sc. and Ph.D. in both mathematics and mathematics education is increasing in the past few years.

SQU Center for Excellence in Teaching and Learning (CETL):

Recently, and in order to provide an inviting, dynamic learning experience for students, SQU established the Center for Excellence in Teaching and Learning (CETL). SQU, through CETL, is planning to implement in a phased manner, a mandatory certificate program in higher education teaching for all its faculty members, then in future the center is planning to consider faculty members of other higher education institutions. CETL has launched an action plan for improving the practice of teaching across all colleges of the SQU forming a group of 21 CETL Faculty Fellows nominated by their colleges; one of them is from DOMAS. OMC and CETL delivered a seminar and a workshop targeting training of higher education mathematics professors.

SQU Independent Learning Center (ILC):

From the fact that independent learners are the core of any developed community, SQU established the Independent Learning Center ILC. The center provides several services to student in different subjects including mathematics. SQU through ILC has several Mathematics videos produced by SQU faculty members. Besides, ILC provides software packages that help in learning mathematics independently. ILC also established the Academic Lounge through which mathematics tutoring is done on one-on-one basis.

University of Nizwa Proposes a New M.Sc. Program in Mathematics

Department of Mathematical and Physical Sciences, University of Nizwa plans to start the M.Sc. mathematics program. The program aims to provide advanced training in mathematics with an emphasis on coursework. The program suggests two main tracks, namely; Mathematical Modeling and Mathematics for Teachers.

Colleges of Technology in Oman

Six colleges of technology in Oman teach mathematics at different levels. Those colleges have developed all mathematics courses offered by the colleges of technology. They also implemented several Open Education Resources ORE (eg. videos, tutorials, interactive quizzes, class activities, etc.). In addition, the MOODLE mobile application is adopted in teaching and learning mathematics. Besides, math help center has been recently launched to help students perform better in mathematics.

Appendix 5A

List of OMC Training of Teachers and Educators Series of Workshops

1. OMC Workshop on *"Producing and Sharing Educational Mathematics Videos Using Presentation Tube"*, SQU, Muscat, Sultanate of Oman, May 16, 2015.
2. OMC Workshop on *"Introduction to Tinker Plot"* SQU, Muscat, Sultanate of Oman, 22/11/2015.
3. OMC Workshop on *"Introduction to MathExpert"*, SQU, Muscat, Sultanate of Oman, 22/11/2015.
4. OMC Workshop on *"Introduction to GeoGebra"*, SQU, Muscat, Sultanate of Oman, 22/11/2015.
5. OMC Workshop on *"Mathematics Blended Learning"*, SQU, Muscat, Sultanate of Oman, 22/11/2015.
6. OMC Workshop on *"Presentation Tube in Teaching Mathematics"*, Muscat, SQU, 22/11/2015.
7. 1st OMC Training of Teachers and Educators Workshops, titled: *"Software packages in teaching Mathematics"*, Ministry of Education, Sur, South Sharqeya, Sultanate of Oman, February 25, 2016.
8. 2nd OMC Training of Teachers and Educators Workshops, titled: *"Moodle in Teaching Mathematics"*, Nizwa College of Technology, Nizwa, Dakhilia, Sultanate of Oman, March 25, 2016.
9. 3rd OMC Training of Teachers and Educators Workshops, titled: *"Using SPSS in Assessments Analysis"*, College of Applied Sciences, Al Rustaq, South Batina, Sultanate of Oman, April 28, 2016.
10. 4th OMC Training of Teachers and Educators Workshops titled: *"Mathematics Educational Video Production"*, SQU, Muscat, Sultanate of Oman, May 12, 2016.
11. 5th OMC Training of Teachers and Educators Workshop, *"GeoGebra"*, SQU, Muscat, Oman, 26/5/2016.
12. 6th OMC Training of Teachers and Educators Workshops, titled: *"Educational videos in Teaching Mathematics"*, Dhofar University, Salalah, Dhofar Sultanate of Oman, September 29, 2016.
13. 7th OMC Training of Teachers and Educators Workshops, titled: *"Moodle in Teaching Mathematics"*, Ministry of Education, Khassab, Musandam, Sultanate of Oman, October 25, 2016.
14. 8th OMC Training of Teachers and Educators Workshops titled: *Principles "Underlying the Design of the UCSMP Curriculum for Secondary Schools"*, Muscat, Sultanate of Oman, November 16, 2016.
15. 9th OMC Training of Teachers and Educators Workshops titled: *"Mathematical Modeling in the School Curriculum"*, SQU, Muscat, Sultanate of Oman, November 17, 2016.
16. 10th OMC Training of Teachers and Educators Workshops titled: *"Geometry of the Shape and The Shape of Geometry"*, SQU, Muscat, Sultanate of Oman, November 18, 2016.
17. 8th Training of Teachers and Educators Workshops embedded in Oman Mathematics Day II, titled: *"Mathematics Textbooks from Publishers Perspective"*, SQU, Muscat, Oman, 21/11/2016.
18. 11th OMC Training of Teachers and Educators Workshops embedded in Oman Mathematics Day II, titled: *Mathematical Stories: "Understanding Mathematics Curricula"*, SQU, Oman, 21/11/2016.
19. 12th OMC Training of Teachers and Educators Workshops embedded in Oman Mathematics Day II, titled: *"How to Develop Mathematical Thinking"*, SQU, Muscat, Sultanate of Oman, 22/11/2016.
20. 13th OMC Training of Teachers and Educators Workshops embedded in Oman Mathematics Day II, titled: *"Mathematics in Everyday Context"*, SQU, Muscat, Sultanate of Oman, November 22, 2016.
21. 14th OMC Training of Teachers and Educators Workshops embedded in Oman Mathematics Day II, titled: *"Integrating Geogebra into Mathematics Curricula"*, SQU, Muscat, Oman, 22/11/2016.
22. 16th OMC Training of Teachers and Educators Workshops, titled: *"Educational videos in Teaching Mathematics"*, SQU, Muscat, Sultanate of Oman, December 25, 2016.
23. 17th OMC Training of Teachers and Educators Workshops, titled: *"Moodle in Teaching Mathematics"*, SQU, Muscat, Sultanate of Oman, March 22-23, 2017.
24. 1st OMC Training of Trainers Intensive Course on *"Using GeoGebra in Teaching Mathematics"*, SQU, Muscat, Sultanate of Oman April 16-20, 2017.
25. 18th OMC Training of Teachers and Educators Workshops, titled: *"Using Software in Teaching and Learning Mathematics"*, SQU, Muscat, Sultanate of Oman, April 26-27, 2017.
26. 1st OMC Workshop for *Excellence in Teaching and Learning Mathematics in Higher Education*, SQU, Muscat, Sultanate of Oman, May 10, 2017.
27. 19th OMC Training of Teachers and Educators Workshops, titled: *Producing Mathematics Educational Videos (1)*, SQU, Muscat, Sultanate of Oman 24-25/9/2017.
28. 20th OMC Training of Teachers and Educators Workshops, titled: *Producing Mathematics Educational Videos (2)*, SQU, Muscat, Sultanate of Oman 24-25/10/2017.
29. 21st OMC Training of Teachers and Educators Workshops, titled: *Producing Mathematics Educational Videos (3)*, SQU, Muscat, Sultanate of Oman 30-31/12/2017.

List of OMC International Workshops in Mathematics Research (IWMR)

- 1- OMC 1st International Workshop in Mathematics Research (1st IWMR) on "*Numerical Optimization*" OMC, SQU, Muscat, Sultanate of Oman, January 3, 2017.
- 2- OMC 2nd International Workshop in Mathematics Research (2nd IWMR) on "*Optimization Software*" OMC, SQU, Muscat, Sultanate of Oman, January 8-9, 2017.
- 3- 3rd International Workshop in Mathematics Research (3rd IWMR) on "*Difference Equations*" OMC, SQU, Muscat, Sultanate of Oman, April 5, 2017.
- 4- 4th International Workshop in Mathematics Research (5th IMRW) on "*Algebra, Geometry and More*" OMC, SQU, Muscat, Sultanate of Oman, November 12-15, 2017.
- 5- 5th International Workshop in Mathematics Research (4th IMRW) on "*Complex Analysis*" OMC, SQU, Muscat, Sultanate of Oman, November 19, 2017.
- 6- International Conference on "Operation Research and Applications", SQU, Muscat, Sultanate of Oman, 2-3 April, 2018.

Appendix 5B:

Other Mathematics Activities held in Oman

In addition to the above list of OMC activities there are several International Mathematics conferences and workshops held in Oman.

International Conferences in Mathematical Sciences:

Below is the list of International conferences in mathematical sciences organized in Oman, from 2008 till present:

- 1- International Conference on "Numerical Analysis and Optimization (NAOII)", SQU, Muscat, Sultanate of Oman, 6-8 April, 2008.
- 2- International conference on "Mathematical Modeling", SQU, Muscat, Oman, 23-26/2/2009.
- 3- International conference on "Analysis and Applications", SQU, Muscat, Oman, 24-26 January 2010.
- 4- 2nd Int'l Conference on "Numerical Analysis and Optimization (NAOII)", SQU, Muscat, Oman, 3-6/1/2011.
- 5- Int'l conference on "The Theory of Radicals, Rings and Modules" SQU, Muscat, Oman, 20-26/1/2012.
- 6- The 19th International Conference on "Difference Equations and Applications", SQU, Oman, 26-30/5/13.
- 7- 3rd Int'l Conference on "Numerical Analysis and Optimization (NAOIII2014)", SQU, Muscat, Sultanate of Oman, January 5-9, 2014
- 8- 4th Int'l Conference on "Numerical Analysis and Optimization (NAOIII2014)", SQU, Muscat, Sultanate of Oman, January 2-5, 2017.

Workshops and Seminars

Below is the list of workshops in mathematical sciences organized in Oman, from 2010 until present:

- 1- 3rd "*Algebra, Geometry and Applications Workshop*", SQU, Muscat, Sultanate of Oman, 22/12/ 2010.
- 2- "*SQU-Cambridge Mathematics Workshop*" SQU, Muscat, Sultanate of Oman, October 29-31, 2011.
- 3- Workshop on "*Numerical Methods for PDE's Analysis and Applications*" SQU Oman 10-11/1/2012.
- 4- 4th "*Algebra, Geometry and Applications Workshop*", SQU, Muscat, Sultanate of Oman, 22/12/2012.
- 5- Workshop on "*Unsolved problems in pure mathematics*", at Al Musanna College of Technology, Al Musanna, Sultanate of Oman January 11, 2016.
- 6- Workshop on "*Chaos theory & fractals*" at Musanna College of Technology, Musanna, Oman, 20/2/17.
- 7- Workshop on "*Information Technology and Applied Mathematics*" 2017. (SITAM 2017), Shinas College of Technology, Shinas, Sultanate of Oman, March 15, 2017.
- 8- "*SQU-Cambridge Mathematics Workshop*" SQU, Muscat, Sultanate of Oman, April 2-5, 2017.
- 9- 1st Workshop on "*Branching of Science and Mathematics Curricula in Grades 9 and 10*", Ministry of Education, Muscat, Sultanate of Oman, April 17, 2017.
- 10- 2nd Workshop on "*Discussing the Results of TIMSS*", Ministry of Education, Muscat, Oman, 19-20/4/17.
- 11- Workshop on "*The Use of OER to Enhance The Quality of Teaching and Learning*", HCT, Muscat, 20/4/17.
- 12- Workshop on "*High School Mathematics*", Arab Open University, Muscat August 13-24, 2017.

General Events that Include Mathematics Sessions

General events, conferences, and workshops have mathematics sessions embedded in it. Below is a list of such events

- 1- 7th International Conference on "*Science, Mathematics and Technology Education (SMTE7)*", SQU, Muscat, Sultanate of Oman, April 4-7, 2012.
- 2- 4th International Conference of the College of Education on "*Academic Accreditation, the way to Ensuring Sustainability of Education*", November 14-17, 2017.
- 3- *Young Explorer Program I*, SQU, Muscat, Sultanate of Oman, summer 2015.
- 4- *Young Explorer Program II*, SQU, Muscat, Sultanate of Oman, Summer 2016.
- 5- *Young Explorer Program III*, SQU, Muscat, Sultanate of Oman, Summer 2017.
- 6- 6th Int'l Conf. on "*Information Technology and People with Disabilities*", SQU, Muscat, Oman, 19-21/12/ 17.