الأكاديمية الصحية
Health Academy

Electrocardiogram (ECG) TECHNICIAN PROGRAM

Syllabus

الهيئة السعودية للتخصصات الصحية
Saudi Commission for Health Specialties

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INTRODUCTION

Program Overview

Electrocardiogram (ECG) is one of the basic and primary diagnostic procedures that is used to make a diagnosis of heart diseases for both adult and pediatric patients. A proper ECG strip can provide the cardiologist with accurate details of the patient's status and help to decide the treatment plan. Most of ECGs are done by healthcare workers who are not properly trained to perform and analyze ECG e.g. nurses, nurse aid, etc. To ensure accuracy and best outcomes, ECG should be performed by professionals, who are adequately trained through a nationally accredited ECG program that enables them to perform as well as analyze the strips to make faster diagnosis and save time for appropriate treatment.

Program Description

The Electrocardiogram (ECG) Technician program aims to provide the theoretical knowledge and the practical competencies required to perform the electrocardiographic exams necessary for the identification of cardiovascular disorders and heart diseases (congenital or acquired). With an overall length of 4 blocks (one year), the ECG Technician Program is a full-time course that includes theoretical lectures, workshops and supervised clinical practice across several inpatient and outpatient settings enhancing an overall comprehension of electrocardiography in adult and pediatric patients.

With a clinical exposition throughout all the length of the program, the theoretical contents of this course are divided into different modules allowing a progressive comprehension of the several scientific and technological subjects.

Upon the successful completion of this program, the trainee(s) will be able to competently perform electrocardiographic exams, correlating the findings with the clinical evidence and enhancing the identification of several cardiovascular pathologies. The trainee(s) will also be able to contribute to the organizational quality improvement projects, being competent to lead or participate in research projects in this area.

This program is designed for those who hold a degree in Bachelor of Science.

Electrocardiogram (ECG) program: 4 blocks (1 year)

Vision

To provide a world-class training program in the field of electrocardiography technology.

Mission

To promote the profession of electrocardiography technology among Saudi men and women interested in joining healthcare services to increase the workforce in healthcare and to serve the national health system with graduates in electrocardiography technology.

PROGRAM GOAL AND COMPETENCIES

Goal

The goal of the program is to prepare competent entry-level ECG Technicians with strong knowledge, skills and affective behavior learning domains who can fulfil the country-wide ECG needs.

Teaching Strategies

- Interactive theoretical lecture and discussion
- Laboratory and practical field learning
- Bedside clinical skills competencies
- Case-based learning
- Problem Based Learning (PBL)
- Presentation by trainees
- Group discussion
- Seminar and tutorial
- Independent self-study
- E-learning

- Continuous assessment
  - ✔ Quizzes
  - ✔ Assignments
  - ✔ Case Report

- Written Exam
  - ✔ Multiple choice
  - ✔ Essay questions
  - ✔ Objective Structured Clinical Examination (OSCE)
  - ✔ Objective Structured Practical Examination (OSPE)

Program Competencies

Knowledge and Skills Related to Coordinated Patient Care

- Describe factors affecting healthcare environment and patient safety
- Understand the specifications for standard patient identification and patient privacy
- Demonstrate competency in applying the patient / procedure matching protocols
- Identify the patient rights and responsibilities
- Discuss key factor required to educate patients about the procedure
- Apply safe patient transfer and transport standards (e.g., body mechanics and ergonomics)
- Discuss principles of effective communication and patient education
- Describe patient identification standards and documentation process
- Identify high-alert ECG findings and take the appropriate action
- Apply principles of medical ethics in clinical practice
- Demonstrate appropriate professional behavior towards patients
- Apply effective communication skills in the clinical settings
- Practice patient education skills in relation to the ECG procedure

Occupational Safety and Infection Control

- Explain the universal infection prevention and control precautions
- Identify medical procedure associated with risk of radiation exposure
- Demonstrate various strategies to handle and minimize radiation exposure
- Identify the human-machine environment relationship

- Apply work ergonomics as a tool for healthier and safer work conditions
- Participate in programs designed to ensure employee health and safety

Language and Communication Skills and Techniques

1. Healthcare Communication - General English

- Name common English grammar rules
- Identify common English grammar mistakes
- Understand English structure, sentence types, and part of speech
- Apply effectively the basic English language communication
- Demonstrate command of the conventions of standard English grammar
- Show of use of proper capitalization, punctuation, and spelling when writing

2. Medical Terminology

- Demonstrate the benefit of using medical terminology
- Identify the common medical terminology prefixes, suffixes, and word roots
- Recognize and match common Cardiovascular abbreviations and their meaning
- Describe the use of common cardiovascular medical terminologies

3. Computer Skills

- Understand the importance of utilizing electronic medical record in health care setting.
- Demonstrate adequate communication skills using telephone or emails in hospital setting
- Perform basic troubleshooting of cardiac information management system related to ECG.

Basic Cardiovascular Knowledge on Anatomy and Physiology

1. Anatomy

- Describe the location and position of the heart within the body cavity
- Describe the internal and external anatomy of the heart
- Identify the tissue layers of the heart
- Relate the structure of the heart to its function as a pump
- Compare systemic circulation to pulmonary circulation
- Identify the veins and arteries of the coronary circulation system
- Trace the pathway of oxygenated and deoxygenated blood thorough the chambers of the heart

2. Physiology

- Relate heart rate to cardiac output
- Describe the effect of exercise on heart rate
- Identify cardiovascular centers and cardiac reflexes that regulate heart function
- Describe factors affecting heart rate
- Distinguish between positive and negative factors that affect heart contractility
- Summarize factors affecting stroke volume and cardiac output
- Describe the cardiac response to variations in blood flow and pressure
- Describe the relationship between blood pressure and blood flow
- Summarize the events of the cardiac cycle
- Compare atrial and ventricular systole and diastole
- Relate heart sounds detected by auscultation to action of heart's valves

Basic Cardiovascular Pharmacology

- Describe the general principles of pharmacology
- Identify and describe drugs that affect the cardiovascular system
- Explain drugs that affect the Autonomic Nervous System (ANS)
- Discuss drugs that affect the Central Nervous System

Basic Cardiovascular Pathophysiology

- Describe heart failure, underlying mechanism and signs & symptoms
- List types of heart failure and signs and symptoms
- Explain ischemic process and early & late changes in infarction
- Identify key complications and clinical presentations of myocardial infarction
- Discuss atherosclerosis process, stages of plaque development, risk factors and complications of atherosclerotic plaques
- Identify cardiac disease that affect conduction system

Basic ECG Knowledge and Skills

- Apply the gained knowledge to perform ECG across various ECG machines
- Identify normal electrocardiographic rhythm
- Explain atrial activation and repolarization, P-wave, and heart rate variability
- Describe the atrioventricular node conduction and the PR-Segment
- Discuss the ventricular activation and the terminology for the QRS complex

- Understand the sequency of ventricular recovery, normal ST-wave, and normal variant
- Demonstrate competency in analyzing normal ECG rhythm
- Define all the components of ECG graph
- Describe systematic interpretation of abnormal ECG
- Identify each abnormal ECG rhythms
- Explain the clinical significance of each abnormal ECG
- Define abnormal ECG rhythms associated with the SA Node, Atria, AV node, ventricles
- Explain diagnostic criteria and clinical significance of ventricular hypertrophy, various interventricular conduction delays, and myocardial ischemia or infarction
- Identify the localization of ischemia or infarction
- Demonstrate skills to analyze normal ECG Rhythm strips
- Apply the gained knowledge to read normal ECG rhythms
- Identify clinical criteria of normal ECG strips.
- Demonstrate essential skills to properly operate the ECG machine
- Demonstrate basic equipment hardware maintenance and troubleshooting
- Apply principle of cleaning and maintaining equipment and instruments such as cardiac (ECG) monitor, telemetry transmitter cables, electrodes, and central monitor, strip recorders, and central printers
- Demonstrate their ability to communicate with Bio Medical Engineering staff to maintain and repair the equipment in case of emergency situations.

Advanced Knowledge and Skills in ECG Interpretation and Monitoring

- List types of ambulatory ECG monitoring and their diagnostic efficacy
- Describe when to use continuous ECG (Holter) monitoring, event monitoring, and mobile cardiac outpatient telemetry (MCOT)
- List types of exercise testing, advantages and disadvantages
- Explain Indications, Contraindications, limitations
- Describe different stages of exercise test procedure
- Discuss the ECG abnormalities during exercise and during recovery
- Demonstrate skills to analyze normal ECG Rhythm strips,
- Apply the gained knowledge to read normal ECG rhythms
- Identify clinical criteria of normal ECG strips.

PROGRAM SYLLABUS

The required period for completion of this program is one calendar year

	Module Name	Total Credit Hour	Total Contact		Duration
			Theory	Practical	
Block I	1. Healthcare Communication	2	30	0	9 Weeks
	2. Medical Terminology	2	30	0	
	3. Patient Care Skills	1	15	0	
Block II	4. Cardiac Anatomy and Physiology	2	30	0	9 Weeks
	5. Basic Pharmacology	1	15	0	
	6. Fundamental Principles of ECG	3	45	0	
Block III	7. Pathophysiology	2	30	0	9 Weeks
	8. ECG Rhythm Analysis	2	30	0	
	9. Clinical Practicum I	4	0	120	
Block IV	10. Advanced ECG Diagnostics	2	30	0	9 Weeks
	11. Clinical Practicum II	6	0	180	
		27	555		
Internship			540		3 Months
Total			**1095 hours**		**48 weeks**

ASSESSMENT AND GRADING CRITERIA

Table 1: Assessment and Evaluation Scheme for Program Completion - Theoretical		
Assessment and Grading System	**Assessment Tools**	**Weight**
	Attendance and participation	10%
	Continuous Assessment • 2 Quizzes (2 X 5 marks) 10% • Assignments 10%	20%
	Midterm Exam • Written Examination	30%
	End of the Block Assessment • Final Written Examination	40%
Total		**100%**
Passing Score	70%	
Final Grading	Pass/Fail	

Table 2: Assessment and Evaluation Scheme for Program Completion - Practical		
Assessment and Grading System	**Assessment Tools**	**Weight**
	Attendance and participation	10%
	Continuous Assessment • Bedside competencies 20% • Case-based discussion 20%	40%
	End of Block Assessment 50% • Objective Structured Clinical Examination (OSCE)	50%
Total		**100%**
Passing Score	**70%**	
Final Grading	**Pass/Fail**	

PROGRAM REFERENCES

Block I

1. The Language of Medicine by Davi-Ellen Channer, 11th edition; Manufacturer No, ISBN Number 9780323370813

2. Essentials of Sonography and Patient Care; Marveen Craig, 2nd Edition, 2016. ISBN: 139781416001706

Block II

1. Essentials of Anatomy and Physiology, By Valerie C. Scanlon, Tina Sanders, 8th edition, ISBN10 0803669372, ISBN13 9780803669376
2. Human Anatomy and Physiology, an Open Stax College resource, ISBN-13: 978-1-938168-13-0 (Available as PDF Book).
3. CARDIAC DRUG THERAPY, Seventh Edition by M. GABRIEL KHAN, MD, FRCP, FACC, Associate Professor of Medicine, University of Ottawa, and Cardiologist, The Ottawa Hospital, Ottawa, Ontario, Canada (Available as PDF Book).
4. Brenner and Stevens' Pharmacology, 5th Edition, Craig Stevens George Brenner, eBook ISBN: 9780323391689, Paperback ISBN: 9780323391665
5. Pathophysiology of Heart Disease, A Collaborative Project of Medical Students and Faculty, Editor Leonard S. Lilly, 5th Edition, ISBN 978-1-60547-723-7 (Available as PDF Book).
6. Pathophysiology of Heart Disease, 4th ed. Philadelphia, Lippincott Williams & Wilkins, 2007.
7. Heart Physiology and Pathophysiology, 4th Edition, Yoshihisa Kurachi Andre Terzic Michael Cohen, eBook ISBN: 9780080533889, Hardcover ISBN: 9780126569759

Block III

1. The ECG Made Easy, By John R. Hampton, Churchill Livingstone, 8th Edition, 2013.
2. ECG interpretation made incredibly easy, 5th ed.by Lippincott Williams & Wilkins. © 2011 ISBN 978-1-60831-289-4
3. The Only EKG Book You'll Ever Need, 8th edition. Thaler. Lippincott Williams and Wilkins. 2015
4. Rapid Interpretation of EKG's, Sixth Edition 6th Revised ed. Edition by Dale Dubin (Author) ISBN-13: 978-0912912066
5. Goldberger's Clinical electrocardiography, A simplified approach, ninth Edition.
6. ECG Diagnosis: A Self-Assessment Workbook, Edward K. Chaung, M, Thomas Jefferson University Hospital, ISBN: 0-86542- 587-6 (available as PDF Book).

7. Cardiac Pacemakers and Defibrillators, Second Edition. Charles J. Love, M.D. Ohio State University Medical Center, Columbus, Ohio. ISBN: 1-57059-691-3 (available as PDF Book).

Block IV

1. Braunwald's Heart Disease A Textbook of Cardiovascular Medicine. Volume 1. Ninth Edition
2. Chareonthaitawee. P., Askew. W.J, (2021) Exercise ECG testing: Performing the test and interpreting the ECG results. UpToDate. Retrieved May 22, 2021 from https://www.uptodate.com
3. Crawford. H. Michael et al. ACC/AHA Guidelines for Ambulatory Electrocardiography: Executive Summary and Recommendations. Originally published 24 Aug 1999https://doi.org/10.1161/01.CIR.100.8.886 Circulation. 1999; 100:886–893
4. NAHQ. HQ Solutions: Resource for the Healthcare Quality Professional. Wolters Kluwer Health. Kindle Edition.
5. Pelletier. R. Luc., Beaudin. L. C. (2017) HQ Solutions: Resource for the Healthcare Quality Professional. Wolters Kluwer Health.
6. Prutkin. M. Jordan, (June 10 2019). ECG tutorial: Basic principles of ECG analysis. UpToDate. Retrieved May 22, 2021 from https://www.uptodate.com
7. Sandau, E.K et al. (2017). Update to Practice Standards for Electrocardiographic Monitoring in Hospital Settings: A Scientific Statement From the American Heart Association, Circulation; 136:e273–e344. https://doi.org/10.1161/CIR.0000000000000527
8. Tighe A. Dennis. (2020). Pocket Guide to Stress Testing (2nd Edition). Wiley.

Other Learning Resources:

1. Clinical Procedures for Safer Patient Care. https://opentextbc.ca/clinicalskills/
   For more information, please visit COAMS Library Website
2. http://ecg.bidmc.harvard.edu/maven/mavenmain.asp
3. http://en.ecgpedia.org/wiki/Main_Page
4. http://ecg.utah.edu/
5. http://www.ecglibrary.com/ecghome.php
6. http://www.clinicalskills.pitt.edu/electrocardiogram-interpretation/
7. http://www.practicalclinicalskills.com/

الأسئلة المتكررة

كم مدة البرنامج؟

12 شهر

متى سيتم الإعلان عن نتائج الترشيح للمقابلات الشخصية؟

يستغرق فرز طلبات المتقدمين من ثلاثة أسابيع حتى أربعة أسابيع ومن ثم يتم إرسال القبول والرفض للمتقدمين.

ما هو التصنيف الذي يحصل عليه بعد التخرج من برنامج تخطيط قلب من الهيئة السعودية للتخصصات الصحية؟

"فني"

لدي تصنيف صادر من الهيئة السعودية للتخصصات الصحية، هل أستطيع التسجيل في البرنامج؟

نعم، يمكنك التسجيل في البرنامج، علم ا بأنه عند تخرجك من البرنامج واجتيازك لاختبار التصنيف من الهيئة السعودية للتخصصات الصحية فسيتم تغيير تصنيفك إلى "فني"، حيث أن حصولك على هذا التصنيف يلغي أي تصنيف سابق.

هل برنامج فني تخطيط قلب منتهي بالتوظيف؟

نعم، ولكن يشترط أن يجتاز المتقدم جميع اختبارات البرنامج واختبار التصنيف الذي تعقده الهيئة السعودية للتخصصات الصحية.

ما هو المستوى والدرجة التي يتم تعيين فني تخطيط قلب عليها عند التوظيف؟

بحسب سلم الوظائف لجهات التوظيف

هل يمكنني تغيير مقر أو مركز التدريب بعد التقديم على البرنامج؟

تغيير مقر أو مركز التدريب غير متاح.

هل يمكنني التسجيل وأنا على رأس العمل/مسجل في التأمينات الاجتماعية؟

لا، حيث برامج الأكاديمية الصحية تستهدف من هم ليسوا على رأس العمل فقط. وسيتم استبعاد كل من هم على رأس العمل حتى بعد بدء البرنامج.

أين سيكون مقر عملي بعد التخرج؟

التعيين بعد التخرج وفقاً لجهة التوظيف التي سيتم توقيع العقد معها.

هل سيتم صرف مكافأة للمتدربين أثناء الدراسة؟

نعم، يوجد مكافأة شهرية قدرها 1000 ريال سعودي لبرنامج فني تخطيط قلب.

Frequently Asked Questions

How long is the electrocardiogram technician program?

12 Months

How long do the application period and the screening last?

The application screening period takes from three to four weeks, and then the acceptance and exclusion messages are sent to applicants.

Will the electrocardiogram graduates be eligible for classification from the Saudi Commission for Health Specialties? And what type of classification?

Yes, the classification is Technician.

What is the level and degree to which the electrocardiogram graduates is assigned upon employment?

Depends on the employer's scale and grading system

I have a classification issued by the Saudi Commission for Health Specialties, can I apply to Health Academy programs?

Yes, you can apply to the programs; however, when you graduate from the program and pass the classification test from the Saudi Commission for Health Specialties, your previous classification will be replaced by the new classification as obtaining this classification cancels any previous ones if any.

Would I get a job after completing the program?

Yes; however, you are required to pass all the program exams and requirements and the classification test held by The Saudi Commission for Health Specialties.

Can I change the location of training after applying to the program?

No, transferring from one city/training center to another is not allowed.

Can I apply to Health Academy programs while I am working or registered on the General Organization for Social Insurance?

No, Health Academy programs target those who are unemployed. Even after the start of the program, all those in employment will be excluded.

Where will my job be located after graduation?

The location of the job is only determined by the employer with which the contract will be signed when starting the program.

الوصف الوظيفي لفني تخطيط القلب

التفاصيل	
المسمى الوظيفي	فني تخطيط القلب
التصنيف المهني في الهيئة السعودية للتخصصات الصحية	فني تخطيط القلب

الوصف الوظيفي

يؤدي فني تخطيط القلب مجموعة متنوعة من المهام المرتبطة بأداء تخطيط القلب الكهربائي ومعالجته، وهو المسؤول عن المراجعة الأولية لتخطيط القلب للكشف عن أي خلل، وتحليل واستكشاف الاضطرابات مبدئيًا، باتباع الممارسات المعملية الآمنة.

المسؤوليات الرئيسية

- مسؤول عن إجراءات تخطيط القلب الكهربائي (ECG) على المرضى، ضمن السياسات والإجراءات والمعايير المقبولة للممارسة السريرية وسلامة المرضى.
- تجهيز المرضى والمعدات والمواد التشخيصية المستخدمة لإجراء تخطيط القلب القياسي lead ECG-12
- جمع ومراجعة المعلومات الطبية والتاريخية والدوائية ذات الصلة من أجل إجراء الدراسة المناسبة التي يحددها الطبيب.
- التحقق من هوية المريض وشرح الإجراء له، وإبلاغ الطبيب عندما يحتاج المريض للعناية الطبية الفورية.
- المساعدة في توفير إجراءات تخطيط القلب للمرضى الذين يعانون من حالات طبية خاصة.
- تشغيل ومعايرة وصيانة معدات الفحص بما في ذلك تحديد وتصحيح أي تداخل.
- إعداد التقرير الأولي بالنتائج وإرساله للتحليل النهائي للطبيب.
- إرسال تقرير للعاملين في مجال الرعاية الصحية المناسبين وفقًا لسياسة المنشأة.
- ضمان الاستخدام الأمثل للموارد والمشاركة في تنفيذ برنامج تحسين الجودة لضمان وجود مخزون كاف من الإمدادات ومعدات العمل الفعالة، والإبلاغ عن الأعطال والمشاكل من خلال القنوات المناسبة.
- الحضور والمشاركة في الأنشطة التعليمية والتطوير المهني.
- الامتثال لبروتوكول الوقاية من العدوى بالمستشفى واتباع ممارسات وإجراءات العمل الآمنة في جميع الأوقات.
- تعزيز بيئة إيجابية وتعاونية مع أعضاء فريق الرعاية الصحية؛ حضور اجتماعات الإدارات والاجتماعات الأخرى، حسب الحاجة.
- إنشاء التقارير اللازمة والحفاظ على جميع سجلات المرضى المتعلقة بتخطيط القلب.
- إجراء فحص lead ECG-12 لتخطيط كهربية القلب في أماكن رعاية صحية/ سريرية مختلفة.
- التعرف على النتائج غير الطبيعية والإبلاغ عنها.
- ضمان جودة الفحص وإتمام جميع عمليات سير العمل اللازمة المرتبطة بالفحص.
- العمل مع المرضى بجميع الفئات العمرية.
- مراقبة نظم القلب واستجابة القلب باستمرار وتحديد الاضطرابات والتغييرات بشكل دقيق.
- الحفاظ على معدات تخطيط القلب ومستويات العرض كما هو مطلوب.
- التكيف والالتزام بجميع سياسات وإجراءات المنشأة.
- أداء جميع الواجبات الأخرى المتعلقة بالوظيفة.

المؤهلات والمتطلبات
• شهادة برنامج فني تخطيط القلب المعترف بها أو ما يعادلها. • رخصة مزاولة المهنة سارية المفعول من الهيئة السعودية للتخصصات الصحية. • أن يكون الممارس لائق طبيًا. • مهارات استخدام الحاسب الآلي وتطبيقاته. • طلاقة التحدث والقراءة والكتابة باللغة الإنجليزية. • شهادة الإنعاش القلبي الرئوي. • الذكاء العاطفي. • التواصل الفعال. • العمل ضمن الفريق. • مهارات تنظيم العمل. • مهارات التعامل مع الآخرين. • القدرة على التكيف مع التنقل المتكرر وفترات الجلوس الطويلة.

*قد يختلف الوصف الوظيفي حسب المنشأة