

## Qt Tutorials Course Outline

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### Qt Core

- **Beginner**
  - Qt and Qt Creator
    - Overview
    - Licensing
    - Installing
    - Configuration
    - Kits
    - Help
    - IDE Walk-through
    - Projects types
    - Console Application Hello world
    - Project files
  - Overview of C++
    - History
    - Legacy C++
    - Modern C++
    - Main function
    - Standard library
    - How Qt fits in
    - Example: Hello World with qDebug
  - Comments
    - One line
    - Multi line
    - Special
  - Variables
    - Booleans
    - Numbers
    - const
    - Enums
    - Structs
  - Input and output types
    - STDIN
    - STDOUT
    - STDERR
    - QDebug
  - Flow Control
    - IF (long and short version)
    - IF ELSE
    - Ternary
    - Switch

- Do While
- For and For Each
- Functions
  - Creating
  - Returning values
  - Overloading
  - By ref By value
  - Functions in STRUCT
- Classes
  - Creating / Importing
  - Constructors / Deconstructors
  - Inheriting
  - Abstract and Interfaces
  - Overriding
  - ~~▪ Operator Overloading~~
- Scope
  - Functions
  - Classes
  - Global
- Pointers
  - Stack vs Heap – pointer vs non-pointer
  - creating / deleting
  - Copy Constructors vs pointers – why use pointers at all? FAST!!!
  - Memory management
- Signals and Slots
  - Creating and Connecting
  - Disconnecting
  - Properties
- Casting – example from a signal
  - Normal
  - Static cast
  - Dynamic cast
  - QObject Cast
- Error handling
  - Errors vs exceptions
  - Throwing
  - Try catch
  - qDebug to file
- Generics
  - Generics
  - Generic Functions
  - Generic Classes
- Common Classes
  - QObject

- Qint
- QString
- Qdate Qtime QDateTime
- QByteArray
- Qvariant
- Qvector
- Qlist
- QString List
- Example: using a QVariant to store unknown data types
- **Intermediate**
  - Pointers
    - Parent and Child
    - QWeakPointer
    - QScopedPointer
    - QSharedPointer
  - Collections
    - Qlist
    - QVector
    - QSet
    - QHash
    - QMap
    - QLinkedList
  - Settings
    - QSettings
    - Saving
    - Loading
    - Searching
  - File System
    - QIODevice
    - QDataStream
    - QBuffer
    - QDir
    - QFile
    - QFileInfo
    - QStorageInfo
    - QFileSystemWatcher
    - Qlockfile
    - QTemporaryDir
    - QtemporaryFile
    - QTextStream
    - Reading Files
    - Writing files
    - Appending files
    - Listing directories
    - Listing directories recursively

- Logging
  - `qInstallMessageHandler`
  - `QMessageLogger`
- Encoding data
  - ASCII
  - UTF-8
  - XML
  - JSON
  - Base64
- Compression
  - `qCompress`
  - `qUnCompress`
- Serialization
  - Simple Objects
  - Complex Objects
  - Lists
  - Maps
- Macros
  - `qDeleteAll`
  - `qFill`
  - `qSort`
  - `qCopy`
  - `qFind`
  - `qSort`
- System
  - `QSysInfo`
  - `QProcess`
  - Determine OS at run time
  - Make a command line shell (run command through CMD or bash)
- Timer
  - `QTimer`
  - `SingleShot`
  - `Repeating`
- Meta Object System
  - `QMetaObject`
  - `Q_ClassInfo`
  - Invoke Method
  - Return Type
- Design Patterns
  - Parent Child
  - Signals and Slots
  - Singleton patterns
  - Factories
  - Prototypes

- **Advanced**
  - Sockets
    - Networking fundamentals
    - TCP vs UDP
    - TCP Socket
    - TCP Server Socket
    - QNetworkAccessManager
    - UDP
    - Example: TCP – serialize object and send it to client
  - Threads
    - MoveToThread
    - Qthread
    - QFuture
    - QThreadPool & QRunnable
    - QConcurrence
    - Example: TCP Server
  - Models
    - Model view programming
    - QStringList
    - QStandardItem
    - QFileSystemModel
    - QAbstractItemModel
    - QAbstractList
    - QAbstractTableModel
  - Database
    - Databases
    - Setup MySQL
    - Connection
    - Add Items
    - Update Items
    - Delete Items
    - Search items
    - QSqlQueryModel
    - QSqlTableModel
    - QSqlRelationalTableModel
  - Plugins
    - Creating
    - Loading
    - Using
    - Example: TCP Server with Plugins
  - Libraries
    - Creating
    - Using
    - 3rd Party
    - Encryption

## Qt Widgets

- Beginner
  - o UI Fundamentals
    - QDialog
    - UI Files
    - QSlider and QProgressbar manual connect
    - QSlider and QProgressbar using the GUI
    - QLabel
    - QPushButton – right click and create slot
    - QMessageBox
    - Example – display a save file dialog when closing the QDialog
  - o User Input
    - QCheckBox
    - QRadioButton
    - QSpinBox
    - QDoubleSpinBox
    - QComboBox
    - QDial
    - QSlider
  - o Date and Time
    - QDateEdit
    - QTimeEdit
    - QDateTimeEdit
    - QCalendarWidget
    - Example – flight booking
  - o Text Editing
    - QLineEdit
    - QTextEdit
    - QTextBrowser
    - Example – rich note pad
  - o Layouts
    - Horizontal
    - Vertical
    - Splitters
    - Layouts in layouts
    - Padding and properties
  - o Organizers
    - QScrollArea
    - QButtonGroup
    - QGroupBox
    - QSplitter
    - QSplitterHandle

- QStackedWidget
  - QTabWidget
- Intermediate
  - o Opening Dialogs
    - Open one
    - Open multiple
    - Open modal
    - Sharing data between windows
  - o Main Windows
    - Central Widget
    - Resources
    - QAction
    - QActionGroup
    - QMenu
    - QToolBar
    - QStatusBar
  - o MDI Windows
    - MDI Area
    - New Children
    - Arranging
    - Accessing
    - Closing
  - o Styling
    - QColor
    - QFont
    - QStyle
    - QCommonStyle
    - QStyleFactory
    - Example – creating a custom style
  - o Lists, Trees and Tables
    - QListWidget
    - QTreeWidget
    - QTableWidget
  - o Models and views
    - QStringListModel
    - QStandardItemModel
    - QFileSystemModel
    - QListView
    - QTreeView
    - QTableView
  - o
- Advanced
  - o Custom Widgets
  - o 3d

- o Charts
- o Graphs
- o Graphics
- o Video

## **QML**

- Beginner
- Intermediate
- Advanced

## **Qt Embedded**

- Beginner
- Intermediate
- Advanced

## **Qt Masters – each one is a separate class**

- 3D – Use Qt 3d Studio and Blender
- Firebase
- Boost.io
- OpenCV
- Encryption – OpenSSL or Botan
- High performance TCP Server
- Database